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AUTHOR	Weldon, Kent; Makowski, David J.
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ABSTRACT

Information is provided on the data sources and tools used in-house at the National Center for Higher Education Management Systems (NCHEMS). The objective of the guide is to serve as a central resource for the various data management and analysis activities of NCHEMS. Summaries are provided of NCHEMS information and analytic resources including database descriptions, data management and analysis systems, NCHEMS facilities, and NCHEMS products. The format of the guide is: an abstract for each information brief; a list of documentation and references relevant to the information brief; general information of interest to the entire staff; use of the resource, including data retrieval instructions; and when applicable, technical information on software/hardware or files. The guide covers NCHEMS' database holdings and general information on the Higher Education General Information System. The databases are identified with a unique reference or entry number. The following data management and analysis systems are included: EDSTAT (System 2000), National Education Data Library, MARK IV, and Table Producing Language. Three NCHEMS facilities are covered: NCHEMS' computer services vendors, remote job entry facility, and United Airlines computing services. Finally, the State Postsecondary Education Planning Model is included. (SW)

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INFORMATION AND ANALYTIC RESOURCE GUIDE

PART I: NCHEMS IN-HOUSE RESOURCES

Kent Weldon
David Makowski

November, 1976*

This report has been produced as part of a program supported by the National Institute of Education.

NATIONAL CENTER FOR HIGHER EDUCATION MANAGEMENT SYSTEMS AT
WESTERN INTERSTATE COMMISSION FOR HIGHER EDUCATION

P. O. Drawer P
Boulder, Colorado 80302

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* Originally printed in 1976, this edition contains updates.

PREFACE

This document is Part I of NCHEMS Information and Analytic Resources Guide. It deals primarily with those resources which are located in-house and which are of general interest to the NCHEMS staff. Part II of the Guide, an NCHEMS Directory of PSE Information and Analytic Resources, is intended to complement Part I in describing the wide range of resources of national interest and availability (not just those which NCHEMS maintains in-house). Hopefully, both parts of the Guide will provide NCHEMS staff with new and needed capabilities for addressing information needs.

Both Parts I and II are designed to support and encourage continual modification and extension. As other resources are identified and/or updated, the corresponding pages in the Resource Guide will be reissued to staff during the coming year. A second, revised edition is currently planned for late 1977. Staff comments and criticisms of the existing text are welcome at any time.

This first edition of the Information and Analytic Resource Guide is being distributed only to NCHEMS staff. The format and content do not necessarily reflect an official position of NCHEMS' Board of Directors or NCHEMS' advisory structure.

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	Module	Last Update
State Postsecondary Education Planning Model	P1	(4/76)

Note: All of the entries may not be in this notebook. See Section I2.

NATIONAL CENTER FOR HIGHER EDUCATION MANAGEMENT SYSTEMS AT WICHE

INFORMATION AND ANALYTIC
RESOURCE GUIDE

Information and Analytic
Resource Guide Overview

INFORMATION BRIEF I1

MAY, 1976

ABSTRACT

NCHEMS Information and Analytic Resource Guide is a two-part collection of technical observations, notes, and references on the diverse set of data sources and tools used by and available to NCHEMS staff. Part I of the Resource Guide describes the resources currently available to NCHEMS staff. Part II of the Resource Guide provides short, concise summaries of potentially useful data bases and analytic tools, many of which have yet to be obtained. This information brief summarizes the purpose, structure, and content of the Resource Guide.

PURPOSES OF THE GUIDE

The primary purpose of the Resource Guide is to serve as a central resource for NCHEMS various data management and analysis activities. While many of these activities tend to be, by their very nature, complex, there remains a need to identify, document, and maintain those activities and resources which potentially have long-term value to the Center. This Guide addresses several specific objectives related to this need:

DOCUMENTATIONS AND PUBLICATIONS

- Information and Analytic Resource Guide, Part II: NCHEMS Directory of PSE Information and Analytic Resources, by Kent Weldon and David Makowski; NCHEMS at WICHE: Boulder, Colorado - April, 1976

- NCHEMS Technical Information Library. This Library contains detailed information and documentation for both NCHEMS in-house resources and for other generally available resources. The Library is organized by entry number and is located in Room 226.

- A Reference Guide to PSE Data Sources, by Katherine A. Allman. NCHEMS at WICHE; Boulder, Colorado - 1975

- provide rudimentary summary information to the staff on data bases or analytical tools of general or ongoing interest

- Provide a structure within which most of the resources used by staff can be documented for others to use

- Capsulize those resource descriptions which are unwieldy or voluminous into a format which allows, at minimum, cursory examinations for utility in particular applications

- Provide a mechanism through which often undocumented observations, errors, and usage advice can be easily disseminated from one staff member to many others

- Identify other information resources and documentation which directly addresses particular data bases or analytical tools (for example, the EDSTAT system and the HEGIS data base--see Information Briefs S1 and D2)

- Establish a current and accurate profile of the nature and extent of both NCHEMS in-house resources and also those generally available elsewhere

DESIGN OF THE RESOURCE GUIDE

The Resource Guide is currently divided into two major parts each of which is subdivided into more narrowly defined subject-matter areas:

Part I: Summaries of NCHEMS Information and Analytic Resources

Section 1 - Introductory Information

Section 2 - Data Base Descriptions

Section 3 - Data Management and Analysis Systems

Section 4 - NCHEMS Facilities

Section 5 - NCHEMS Products

Part II: NCHEMS Directory of PSE Information and Analytic Resources

Section 1 - Cross-reference Index

Section 2 - Data Base Entries

Section 3 - PSE Analytical Tool Entries

Section 4 - Other Helpful Contacts and Resource Guides

Parts I and II differ primarily in terms of scope and depth rather than in subject matter. Part I deals with those resources which are (1) of general interest to NCHEMS staff working in different project areas, and (2) currently available or accessible to staff. Part II provides a working "universe" of information and analytic resources, some of which may be relatively inaccessible to NCHEMS staff for reasons of confidentiality, cost, etc. Similarly, Part I is intended as a mechanism for documenting those facts, observations, and procedures which have evolved from staff work with particular resources, while Part II presents only the basic information necessary about each resource for the user to decide whether further investigation on a resource is warranted.

Both Parts I and II are envisioned as growing, "living" documents designed to be continually extended, updated, and improved, thus neither document will ever be completed. Both documents are designed to facilitate modification--

in the case of Part I, complete information "briefs" or summaries will be added, deleted, or modified, whereas in Part II entry pages will be added, deleted, or modified. This update process is currently planned and budgeted to continue at least through fiscal year 1976.

An attempt is made to keep each information brief within a general format. The format is:

- An abstract for each brief on the first page
- A list of documentation and references relevant to the information brief on the second page of each brief
- A section of general information intended to be of interest to the entire staff
- When applicable, a section of technical information following the general information section to be of use to those staff in need of more technical details

NCHEMS TECHNICAL INFORMATION LIBRARY

Both Parts I and II of the Resource Guide refer directly to NCHEMS Technical Information Library. This Library is a systematic collection of data base and analytical tool documentations, bound into three-ring notebooks to simplify access and maintenance. These notebooks are identified by a four-digit accession number which is cited directly in the Resource Guide for clarity.

The Technical Information Library is easily accessible to all NCHEMS staff and is currently located in Room 226. Documents for which there is more than one copy can be checked out to staff.

INFORMATION AND ANALYTIC
RESOURCE GUIDE

SUMMARY OF EXISTING AND PROPOSED INFORMATION BRIEFS

INFORMATION BRIEF I2

MAY, 1976

ABSTRACT

This information brief lists the current status of the information briefs in Part I of the Guide. Date of availability refers to when the brief is to be entered into the Guide if it is not already available ("current"). Each notebook will minimally contain those briefs of general interest, described by "general" under the distribution column. Those briefs which are labeled "limited" are initially being distributed to those staff members with special interests in those areas. However, all briefs are available upon request and should be inserted into the appropriate place in the notebook if obtained.

INTRODUCTORY INFORMATION		Date of Availability	Distribution
I1	Information and Analytic Resource Guide Overview	Current	General
I2	Summary of Existing and Proposed Information Briefs	Current	General
DATA BASES			
D1	NCHEMS Data Base Holdings	Current	General

DATA BASES (CONT'D)		Date of Availability	Distribution
D2	NCHEMS - General Information	Current	General
D7	Statewide Analysis Data Base	9/76	General
D8	City and County Data Book	9/76	General
D9	NCHEMS Participating Institutions	9/76	General
D10	Parne's Longitudinal Data Base	9/76	Limited
D11	NCES National Longitudinal Survey	9/76	Limited
D12	HEGIS - Employees	9/76	Limited
D13	HEGIS - Residency and Migration	9/76	Limited
D14	Information Exchange Procedures	9/76	Limited

SYSTEMS

S1	EDSTAT Data Retrieval System	Current	General
S2	NEDL (National Education Data Library)	Current	General
S3	MARK IV Data Management System	Current	General
S4	TPL (Table Producing Language) System	Current	General
S5	OSIRIS Statistical Package	9/76	General
S6	CENTS-AID-II	9/76	Limited

FACILITIES

F1	NCHEMS' Computer Services Vendors	Current	General
F2	NCHEMS' Remote Job Entry Facility	Current	General
F3	United Airlines Computer Services	Current	General

PRODUCTS		Date of Availability	Distribution
P1	State Postsecondary Education Planning Model	Current	General
P2	Costing and Data Management System	9/76	General
P3	Higher Education Finance Manual	9/76	General
P4	Cost Analysis Manual	9/76	General
P5	Program Classification Structure	9/76	General

NATIONAL CENTER FOR HIGHER EDUCATION MANAGEMENT SYSTEMS AT WICHE

INFORMATION AND ANALYTIC
RESOURCE GUIDE

NCHEMS DATA BASE HOLDINGS

INFORMATION BRIEF D1 MAY, 1976

ABSTRACT

Over the course of its existence, NCHEMS has gathered data bases to support product development and analytical investigations. These data bases, when viewed as a whole, constitute a major on-going information resource to NCHEMS staff which should be maintained and further developed in anticipation of future project needs within the Center.

This section contains brief descriptions of the various data bases currently available at NCHEMS along with technical characteristics and usage information for each resource. All data bases are identified with a unique reference or entry number which provides access to Part II of the Resource Guide (NCHEMS Directory of PSE Information and Analytic Resources) and also to NCHEMS Technical Documentation Library. A staff member who is familiar with the data base is listed as a contact person to provide further information on the data base.

DOCUMENTATION AND PUBLICATIONS

- Information and Analytic Resource Guide, Part II: NCHEMS Directory of PSE Information and Analytic Resources, by Kent Weldon and David Makowski; NCHEMS at WICHE: Boulder, Colorado - April, 1976

- NCHEMS Technical Information Library. This Library contains detailed information and documentation for both NCHEMS inhouse resources and for other generally available resources. The Library is organized by entry number and is located in Room 226.

County and City Data Book

Machine-readable form of the information contained in the County and City Data Book series published by the Bureau of the Census. The data items selected are those for which the statistics represent generally useful summary measures, and are available in comparable form for all counties or for all cities. Most of the statistics were derived from appropriate census surveys. Information for states, counties, SMSA's, cities, and unincorporated urban places is included. (Contact: David Makowski - 5204)

Parnes' National Longitudinal Survey

The study was conducted by Herbert S. Parnes of the Center for Human Resources at the Ohio State University beginning in 1966 and completed in 1974. The survey involved four groups of 5,000 people each--men 45-59 years old, women 30-44 years old, and young men and young women 14-24 years old. Included in the survey are measures of labor market behavior, factors affecting labor supply, unemployment experiences, and the process of occupational entry. Each individual in the sample was interviewed periodically over a five-year period in order to complete work histories as well as to record changes in those characteristics reflecting labor market behavior. NCHEMS currently has only the men and women files in readily accessible format. (Contact: David Makowski - 5401)

National Longitudinal Study - NCES

This study, supported by NCES, is a sample survey designed to provide data on what happens to young adults after they leave high school. The current data base includes the base-year 1972 and the first year followup in 1973. The base-year data includes factors related to the high school students' personal-family income background, education and work experiences, postsecondary education plans, aspirations and attitudes, test results of both verbal and nonverbal ability, and items from the students' high school records. The first followup collected information about the respondents' activity status (e.g., education, work) and educational, work, and career plans. A series of subsequent periodic followups will collect much of the same information for trend analysis. (Contact: David Makowski - 5903)

HEGIS - Opening Fall Enrollment

Institutional enrollment information is collected by such categories as sex, level, degree status, and FTE. The HEGIS opening fall enrollment survey instrument was condensed somewhat beginning in academic year 1973-74; thus the file format is not consistent across all years. (Contact: Kent Weldon or David Makowski - 5904)

HEGIS - Institutional Characteristics

This data base is commonly called the "FICE Tape" which is used to produce Office of Education's Higher Education Directory. It comprises basic descriptive information for each Higher Education institution in the country including enrollment size, level of highest degree granted, Congressional district, state, county, etc. An exhaustive set of accreditation indicators is recorded, as are the principal officers of each institution. This data base is available in both Office of Education transactional format and in EDSTAT format. (Contact: Kent Weldon or David Makowski - 5905)

HEGIS - Financial Characteristics

This survey instrument has sections for current fund revenues, current fund expenditures, phsyical plant assets, and worth of investments. The revenue section contains detailed line item entries from different sources in institutional income, with some line items for restricted use dollars such as financial aid, sponsored research, etc. The expenditure line items are roughly consistent with the NACUBO '71 manual classifications. This file is available in EDSTAT format in OE transactional format. (Contact: David Makowski or Kent Weldon - 5906)

HEGIS - Earned Degrees Conferred

This survey is the most extensive instrument used by HEGIS and contains detailed degree counts for each student program area (to the four-digit HEGIS level) for vocational, academic, and professional programs by sex and level of degree. NCHEMS maintains both EDSTAT format (using two-digit aggregations) and NCES' internal format (using four-digit program identification). (Contact: Kent Weldon or David Makowski - 5908)

NSF - Survey of Graduate Science Student Support and Postdoctorals

This survey polls science and engineering departments in universities granting PhD degrees in scientific disciplines. Data items included in the 1974 survey are: numbers of full-time graduate students who received their major support from U. S. Government sources such as DOD, NSF, NIH: nonfederal sources such as institutional and family support; major types of support such as fellowships and traineeships, various categories; foreign students; first-year enrollment; postdoctorals and their source of support; and the number of recipients of GI Benefits. (Contact: David Makowski - 6301)

General Information

NSF Survey of Employment of Professional and Technical Personnel in the Sciences and Engineering

This survey requests statistics on the employment of scientists and engineers by field of science and function (R & D, teaching, etc.) within the institution. Employment categories used are full-time/part-time, doctorates/other, sex, graduate students, and technicians. (Contact: David Makowski - 6302)

NSF Survey of Current and Capital Expenditures for Research, Development, and Instruction in the Sciences and Engineering

This instrument surveys all colleges and universities that offer doctorate or master's degrees in the sciences and engineering, and all other academic institutions with $50,000 or more in research and development expenditures. The survey covers R & D funds by type, source of funds, and field of science. Current expenditures for instruction and departmental research and capital expenditures, both by field of science. (Contact: David Makowski - 6303)

CASE Interagency Reporting System of Federal Support to Universities, Colleges, and Selected Nonprofit Institutions

This system gathers federal government agency data to all universities and colleges receiving federal support (plus selected large nonprofit institutions) by type of program (R & D, R & D plant, facilities for instruction in science or engineering, fellowships and traineeships and training grants, general support for science, and nonscience support), agency distribution, geographic distribution. (Contact: David Makowski - 6304)

Cost Finding Principles Pilot Test

Six institutions participated in the pilot test providing costing information at the four-digit HEGIS level and at the student level. Variables included are: FTE staff, FTE faculty, direct cost, full cost, credit hours, student contact hours, faculty contact hours, and variables from the FAA questionnaire. (Contact: Kent Weldon - 7401)

NCHEMS Participating Institutions

Information is collected on NCHEMS participating institutions that includes: contact person, enrollment, NCHEMS class, control of institution, state and regional affiliation. (Contact: Delma Oberbeck - 7402)

General Information

WIAS Federal Impact Study Data Base

The data in this file was collected and transcribed from several existing sources for use in a study on the impact of federal postsecondary education funding in the Western states. All data was reported at the state level and includes the Office of Education student assistance Programs (BOGS, SEOG, GSL, NDSL, CWS), the Developing Institution Program, Social Security Student Benefits, Veterans Education Benefits, and federal research and development funding. Several of the measures are reported over a period of years (1972-1975), while others are reported for only one year. This file is occasionally updated reflecting the needs arising from further studies within the WIAS project. (Contact: Kent Weldon or David Makowski - 7403)

Information Exchange Procedures Pilot Test Data

Fifteen institutions participating in the 1972-73 pilot test of the IEP project reported discipline and student program costing data. All data including other institutional costs outside of instruction were reported by the full PCS activity center to the four-digit HEGIS code level. The institutions reporting included three community colleges, eight four-year colleges, and four universities. (Contact: Anahid Katchian or David Makowski - 7404)

Faculty Activity Analysis Pilot Test Data Base

Faculty from five institutions participating in a pilot test responded to a survey asking for an estimate of the hours spent during an average week engaged in various activities. The activities were grouped into five areas of teaching, research, public service, internal service, and administrative activity. The faculty were also asked to estimate the percentage contribution of activities to six defined measures of institutional outcomes. The survey was conducted in the spring of 1974 on a one-time only basis. (Contact: Rob Gray or David Makowski - 7405)

NCHEMS - Student Dropout Survey

This survey was undertaken as a part of the Information about Students Project. Questionnaires were mailed out to students from four institutions who had dropped out of school in the previous year. Data include student demographical information, attitudes toward a school, and reasons for leaving school. (Contact: Cathy Bower - 7406)

General Information

Statewide Analysis Project Data Base

Data were transcribed from several published sources and recorded at the state level. Reporting dates for the measures varying by individual measure from 1968 to 1973 with only a few measures being reported for more than one year. The data included general demographical measures (e.g., percent of urban population, 18-20 year old population, personal income, student migration) and state financial measures (e.g., tax revenues, state and local expenditures, state scholarship grants, federal aid to state and local governments). (Contact: Ellen Cherin or David Makowski - 7407)

IEP Student Outcomes Survey Data

As a part of the IEP project, several institutions participated in the Student Outcomes project. Graduating students were asked to fill out the IEP outcomes questionnaire. Information included: date of entry, future plans, and attitudes toward their education. In addition, some institutions provided additional demographical information on each student such as sex, age, GPA, and academic program. (Contact: Anahid Katchian or David Makowski - 7408)

Western States Budgeting Project Data Base

This data base contains summary data for six WICHE states participating in a project to learn more about the design and impacts of formula budgeting. The data base is organized into three files: (1) a file of 110 major research, doctoral degree granting institutions in the country, (2) a similar file but contains all institutions in six Western states, (3) a state file of the 50 states and D. C. containing 27 variables aggregated at the state level.

Data includes a number of expenditure and funding measures for institutions, enrollment, faculty headcount, degrees granted, and other institutional characteristics. The state file has data for population, higher education, expenditures, public/private enrollments, and other demographical and economic indices. (Contact: Dick Williams - 7409)

ANA Inventory of Registered Nurses

This file contains employment, license and educational information, and a limited amount of personal characteristics of RN's. Names and addresses are not in the file. Records are identified by state, county, zip codes, and various region codes. (Contact: Woody Leonhard - 7501)

General Information

ANA Inventory of Licensed Practical/Vocational Nurses

This file contains employment and license information and a limited amount of personal characteristics of LPN's and LVN's. Names and addresses are not in the file. 1974 records are identifiable by state and county codes. 1967 records are identifiable by state and zip codes. (Contact: Ken Malanowicz - 7502)

BHM Survey of Public Health Nurses

This file contains counts of personnel by employment position working in public health agencies. Records are identified by state code, county code, institution identification number, and agency type. (Contact: Ken Malanowicz - 7601)

NLN Special Survey of Schools of Nursing - Men and Minority Students

For each nursing program, this file contains the number of students admitted, enrolled, and graduated who are: LPN's, men, black, Spanish American, and American Indian or Oriental. (The 1969 file has only the first three categories.) Records are identified by state code, school identification number, and program type. (Contact: Ken Malanowicz - 7701)

NLN Nurse Faculty Census

This file contains educational background of the nursing education administrator and all other nurse faculty of nursing programs. Full-time and part-time counts are given for each of five educational backgrounds. Records are identified by state code, school identification number, and program type. (Contact: Ken Malanowicz - 7702)

NLN Annual Survey of Schools of Nursing - LPN

This file contains information on LPN nursing programs. The information contains administrative data on the program, as well as student admissions, enrollments, and graduations. Records are identified by state code and school identification number. (School names and addresses are included.) (Contact: Ken Malanowicz - 7703)

NLN Annual Survey of Schools of Nursing - RN

This file contains information on RN nursing programs leading to a diploma or associate, baccalaureate, master's, or doctoral degree. The information concerns administrative data on the program, as well as student admissions, enrollments, and graduations. Records are identified by state code, school identification number, and program type. (School names and addresses are included.) (Contact: Ken Malanowicz - 7704)

General Information

NCHS Master Facility Inventory - Nonconfidential

Information concerning ownership and size of nursing homes and other residential health institutions in the United States is contained in this data base. These institutions are identifiable on an individual basis. (Contact: Woody Leonhard - 7801)

NCHS Master Facilities Inventory - Confidential

This file contains information on size and staffing of nursing homes and other residential health institutions. Individual institutions cannot be identified. Further, information from this file may only be released at an aggregate level to ensure that individual institutions will not be identified. (Contact: Woody Leonhard - 7802)

AHA - Annual Survey of Hospitals

For each hospital in the U. S. and its territories, information is given to identify the hospital, give counts of facilities provided, quantify scope and type of services provided, and relate staffing patterns. (Contact: Woody Leonhard - 7901)

AHA Survey of Nursing Personnel in Hospitals

This survey requested detailed information on nursing personnel and services from each hospital. This survey was last issued in 1972, and since then has been incorporated into the Annual Survey of Hospitals. (Contact: Woody Leonhard - 7902)

AMA Physician Master File - Subset Only

This file is an aggregation of the Physician inventory and provides counts of medical doctors by type of practice in every county of the U. S. (Contact: Woody Leonhard - 8001)

BHRD - Area Resource File

There is one health resource profile record for each county in the U. S. The data base itself has been constructed from a number of other health personnel resources, data files, and selected population demographic sources. (Contact: Woody Leonhard - 8101)

Technical Information

ENTRY NUMBER

5204 County and City Data Book

Sorted by state, county code.
1972 UAL900828

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DSN=CCDB.1972,UNIT=TAPE8,LABEL=(1,SL,EXPDT=98000)
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5401 Parnes' National Longitudinal Survey

Older Women
1966-1974 UAL900716 and UAL900717

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5402 ***Older Men***
1966, 1974 UAL900713

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DCB=(RECFM=FB,LRECL=12696,BLKSIZE=25392),LABEL=(1,SL,EXPDT=98000)
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5403 ***Younger Women***
1967-1974 CU122105, CU120106, CU120107, and CU120108

IBM binary internal format

ENTRY NUMBER

5404 ***Younger Men***

1967-1974 CU100101, CU100102, CU100103, and CU100104

IBM binary internal format

5903 National Longitudinal Study - NCES

1972 + 1973 followup UAL900711

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DSN=RAH.NLS.RECODED,UNIT=TAPE,DISP=OLD,VOL=(SER=(015880,014953),
LABEL=(1,SL,EXPDT=98000),DCB=(RECFM=FB,LRECL=2063,BLKSIZE=12378)
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5904 HEGIS - Opening Fall Enrollment

All files in FICE order

1972-1973 UAL900073

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1973-1974 UAL900073

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1974-1975 UAL900073

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LABEL=(3,SL,EXPDT=98000),DCB=(RECFM=FB,LRECL=420,BLKSIZE=13020)
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ENTRY NUMBER

5905 HEGIS - Institutional Characteristics
All files in FICE order
1972-1973 UAL900073

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DCB=(RECFM=FB,LRECL=280,BLKSIZE=12880),LABEL=(1,SL,EXPDT=98000)
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1973-1974 UAL900073

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DSN=@1044.INS74CVT,UNIT=TAPE,DISP=OLD,VOL=SER=900073
DCB=(RECFM=FB,LRECL=280,BLKSIZE=12880),LABEL=(2,SL,EXPDT=98000)
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1974-1975 UAL900073

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DCB=(RECFM=FB,LRECL=280,BLKSIZE=12880),LABEL=(4,SL,EXPDT=98000)
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5906 HEGIS - Financial Characteristics
All files in FICE order
1972-1973 UAL900073

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DSN=@1044.FIN73CVT,UNIT=TAPE,DISP=OLD,VOL=SER=900073,
DCB=(RECFM=FB,LRECL=1120,BLKSIZE=12320),LABEL=(9,SL,EXPDT=98000)
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1973-1974 UAL/D00809

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ENTRY NUMBER

5908 HEGIS - Earned Degrees Conferred

***NCES transactional format ordered by FICE, and line item on survey fo
1972-1973 Data in EDSTAT format - ordered by FICE***

1970-1971	UAL900549
1971-1972	UAL900897
1972-1973	UAL900911
1972-1973	UAL900073 (EDSTAT Format)
1973-1974	UAL900912

```
DSN=@1044.EDSTAT.ERD73,UNIT=TAPE,DISP=OLD,VOL=SER=900073,
LABEL=(8,SL,EXPDT=98000),DCB=(RECFM=FB,LRECL=1120,BLKSIZE=12600)

DSN=RAH.ERD6,UNIT=TAPE,DISP=OLD,VOL=SER=900549,LABEL=(1,SL,EXPDT=98000),
DCB=(RECFM=FB,LRECL=170,BLKSIZE=2550)
```

6301 NSF - Survey of Graduate Science Student Support and Postdoctorals

Sorted by ID Code (col 1-10)

1972-1973	UAL900523

```
UNIT=TAPE,DISP=OLD,VOL=SER=900523,LABEL=(1,NL),
DCB=(RECFM=FB,LRECL=400,BLKSIZE=4000)
```

6302 NSF Survey of Employment of Professional and Technical Personnel in the Sciences and Engineering

Sorted by OE Code, card type

1972-1973	UAL900490

```
UNIT=TAPE,DISP=OLD,VOL=SER=900490,LABEL=(1,NL),
DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
```

ENTRY NUMBER

6303 NSF Survey of Current and Capital Expenditures for Research, Development, and Instruction in the Sciences and Engineering
Sorted by OE Code, Record type
1972-1973 UAL900521

```
UNIT=TAPE,DISP=OLD,VOL=SER=900521,LABEL=(1,NL),
DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
```

6304 CASE Interagency Reporting System of Federal Support to Universities, Colleges, and Selected Nonprofit Institutions
Sorted by FICE, Agency, Subagency Code, Card type
1974 UAL900522

```
UNIT=TAPE,DISP=OLD,VOL=SER=900522,
LABEL=(1,NL)DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
```

7401 Cost Finding Principles Pilot Test
Data is an internal format. See Kent Weldon for assistance in accessing the data.
1971-1972

7402 NCHEMS Participating Institutions
Contact Delma Oberbeck
Current CARDS

ENTRY NUMBER

7403 WIAS Federal Impact Study Data Base
Sorted by state code
1972-1975 UAL/D00809

```
DSN=@1044.WIAS,UNIT=3330,DISP=OLD,VOL=SER=D00809,
DCB=(RECFM=FB,LRECL=500,BLKSIZE=5000)
```

7404 Information Exchange Procedures Pilot Test Data
There are 15 files - one per institution each in cost-center order
1972-73 UAL/D00031

```
DSN=@1044.xxxxx.FICE,UNIT=2314,DISP=OLD,VOL=SER=D00031,
DCB=(RECFM=FB,LRECL=326,BLKSIZE=3260)
```

7405 Faculty Activity Analysis Pilot Test Data Base
There are 20 files - one per institution per record format, ordered by faculty ID. For further documentation, see Information Entry 7405 in Room 206.
1972-1973 CU100501

```
LABEL(TAPE1,VSN=100501,LB=KU,F=X,PO=R)
```

7406 NCHEMS - Student Dropout Survey
Contact Cathy Bower or David Makowski
1975 CARDS

ENTRY NUMBER

7407 Statewide Analysis Project Data Base
Ordered by state code, one record per state.
1968-1973 UAL/D00809

```
DSN=@1044.SWA,UNIT=3330,DISP=OLD,VOL=SER=D00809,
DCB=(RECFM=FB,LRECL=1000,BLKSIZE=13000)
```

7408 IEP Student Outcomes Survey Data
There are five files, ordered by student ID.
1973-1974 CU070543

On PF tape. See David Makowski to access.

7409 Western States Budgeting Project Data Base
On PF tape. See Dick Williams to access.
1973-1974 CU070677

7501 ANA Inventory of Registered Nurses
1966 UAL900031, UAL900032, UAL900035, and UAL900036

```
DSN=RN66AGIF.MERGED,UNIT=TAPE,DISP=OLD,LABEL=(1,SL,EXPDT=98000),
VOL=(SER=(NCH151,NCH152,NCH153,NCH154),DCB=(RECFM=FB,LRECL=90,BLKSIZE=18000)
```

1972 UAL900048, UAL900050, UAL900051, and UAL900052

```
DSN=GIFRN72A,UNIT=TAPE,DISP=OLD,LABEL=(1,SL,EXPDT=98000),
DCB=(RECFM=FB,LRECL=80,BLKSIZE=16000)
```

ENTRY NUMBER

7502 ANA Inventory of Licensed Practical/Vocational Nurses
1967 UAL900046

```
DSN=GIFLPN67,UNIT=TAPE,LABEL=(1,SL,EXPDT=98000),
DISP=OLD,VOL=SER=NCH192,DCB=(RECFM=FB,LRECL=75,BLKSIZE=15000)
```

1974 UAL900236

```
DSN=OFA,UNIT=TAPE8,LABEL=(1,SL,EXPDT=98000),
VOL=SER=000780,DCB=(RECFM=FB,LRECL=100,BLKSIZE=1000)
```

7601 BHM Survey of Public Health Nurses
Contact Ken Malanowicz
1972 UAL900054

```
DSN=PHN72,UNIT=TAPE,LABEL=(1,SL,EXPDT=98000),
DISP=OLD,VOL=SER=021393,DCB=(RECFM=FB,LRECL=80,BLKSIZE=32520)
```

1974 UAL900829

```
DSN=PHS74.MASTER,UNIT=TAPE,LABEL=(1,SL,EXPDT=98000),
VOL=SER=CDP001,DISP=OLD,DCB=(RECFM=FB,LRECL=80,BLKSIZE3520)
```

7701 NLN Special Survey of Schools of Nursing - Men and Minority Students
Format of the data is in a special purpose configuration. See Ken Malanowicz for assistance.
1967 1972

7702 NLN Nurse Faculty Census
See Ken Malanowicz for assistance in accessing the data.
1970 1971
1972 1973
1974

ENTRY NUMBER

7703 NLN Annual Survey of Schools of Nursing - LPN
See Ken Malanowicz for assistance in accessing the data.
1968-1974

7704 NLN Annual Survey of Schools of Nursing - RN
See Ken Malanowicz for assistance in accessing the data.
1968-1974

7801 NCHS Master Facility Inventory - Nonconfidential
Nursing Homes
1969 NH UAL900045

```
DSN=MFIHNH69,UNIT=TAPE,DISP=OLD,LABEL=(1,SL,EXPDT=98000),
VOL=SER=NCH205,DCB=(RECFM=FB,LRECL=416,BLKSIZE=12896)
```

Other institutions
1969 OTH UAL900049

```
UNIT=TAPE8,DISP=OLD,LABEL=(1,NL),VOL=SER=900049,
DCB=(RECFM=FB,LRECL=328,BLKSIZE=1968)
```

1971 UAL900223

```
UNIT=TAPE,DISP=OLD,LABEL=(1,NL),VOL=SER=900223,
DCB=(RECFM=FB,LRECL=600,BLKSIZE=3600)
```

1973 UAL900082

```
UNIT=TAPE,DISP=OLD,LABEL=(1,NL),VOL=SER=900083,
DCB=(RECFM=FB,LRECL=184,BLKSIZE=1104)
```

ENTRY NUMBER

7802 NCHS Master Facilities Inventory - Confidential

Contact Woody Leonhard for accessing permission.

1971 UAL900774

```
DSN=HFMLMJS.NUROTH71,UNIT=TAPE,DISP=OLD,LABEL=(1,SL,EXPDT=98000),
VOL=SER=800557,DCB=(RECFM=FB,LRECL=540,BLKSIZE=5400)
```

Contact Woody Leonhard for accessing permission.

1973 UAL900775

```
DSN=HFMFIJS.NUROTH73,DISP=OLD,UNIT=TAPE,LABEL=(1,SL,EXPDT=98000),
VOL=SER=800419,DCB=(RECFM=FB,LRECL=760,BLKSIZE=7600)
```

7901 AHA - Annual Survey of Hospitals

For even number years, the nursing personnel information is included as a part of the hospital survey. For odd years, the information is only hospital information.

1968 UAL900052

```
DSN=HIF68.GIF,DISP=OLD,UNIT=TAPE,VOL=SER=NCH211,
LABEL=(1,SL,EXPDT=98000),DCB=(RECFM=FB,LRECL=1800,BLKSIZE=14400)
```

1969 UAL900052

```
DSN=HIF69.GIF,DISP=OLD,UNIT=TAPE,VOL=SER=NCH211,
LABEL=(2,SL,EXPDT=98000),DCB=(RECFM=FB,LRECL=1800,BLKSIZE=14400)
```

1970 UAL900030

```
DSN=HIF70.GIF,DISP=OLD,UNIT=TAPE,VOL=SER=NCH150,
LABEL=(1,SL,EXPDT=98000),DCB=(RECFM=FB,LRECL=1800,BLKSIZE=18000)
```

ENTRY NUMBER

1971 UAL900053

```
DSN=HIF71.GIF,DISP=OLD,UNIT=TAPE,VOL=SER=NCH212,
LABEL=(1,SL,EXPDT=98000),DCB=(RECFM=FB,LRECL=1800,BLKSIZE=14400)
```

1972 UAL900053

```
DSN=HIF.72.GIF,DISP=OLD,UNIT=TAPE,VOL=SER=NCH212,
LABEL=(2,SL,EXPDT=98000),DCB=(RECFM=FB,LRECL=1800,BLKSIZE=14400)
```

7902 AHA Survey of Nursing Personnel in Hospitals

This information is a part of the hospital survey files.

1968 UAL900052

```
DSN=HIF68.GIF,DISP=OLD,UNIT=TAPE,VOL=SER=NCH211,
LABEL=(1,SL,EXPDT=98000),DCB=(RECFM=FB,LRECL=1800,BLKSIZE=14400)
```

1970 UAL900030

```
DSN=HIF70.GIF,DISP=OLD,UNIT=TAPE,VOL=SER=NCH150,
LABEL=(1,SL,EXPDT=98000),DCB=(RECFM=FB,LRECL=1800,BLKSIZE=14400)
```

1972 UAL900053

```
DSN=HIF72.GIF,DISP=OLD,UNIT=TAPE,VOL=SER=NCH212,
LABEL=(2,SL,EXPDT),DCB=(RECFM=FB,LRECL=1800,BLKSIZE=14400)
```

ENTRY NUMBER

8001 AMA Physician Master File - Subset Only
1973 D00671

```
DSN=@1044.MD.Y1973,DISP=OLD,UNIT=3330,VOL=SER=D00671
```

8101 BHRD - Area Resource File
1970 UAL900029

```
DSN=AHECOUT,DISP=OLD,UNIT=TAPE,LABEL=(1,BLP),
VOL=SER=NCH107,DCB=(RECFM=FB,LRECL=9999,BLKSIZE=4995)
```

INFORMATION BRIEF D2

JULY, 1976

ABSTRACT

The HEGIS data bases constitute a major percentage of the comprehensive information widely available on traditional institutions of higher education. Taken together, these data bases address enrollments, institutional finances, earned degrees, libraries, adult education programs, facilities, student residency and migration, and institutional accreditation.

A number of these information resources have been secured for use by NCHEMS staff in-house, and an even greater number are available to staff through the EDSTAT information retrieval system. This section describes the approach with which these resources have been integrated for use in reporting and analysis.

BACKGROUND

The Higher Education General Information Survey (HEGIS) comprises a set of survey instruments sent to institutions of higher education for completion

DOCUMENTATION AND PUBLICATIONS

- NCHEMS Technical Information Library (Reference Entries 5904 - 5912)
- Information and Analytic Resource Guide, Part II: NCHEMS Directory of PSE Information and Analytic Resources, by Kent Weldon and David Makowski; NCHEMS at WICHE: Boulder, Colorado - April, 1976

in the fall of every year. Certain instruments (schedules) are distributed yearly, others appear on a multi-year cycle, and still others are distributed on an ad hoc basis. The occurrence of various HEGIS instruments is summarized in Figure 1.

It should be noted that schedules change in nature from year to year, hence complicating longitudinal analyses. For example, there is no guarantee that finance data collected for FY 71 is compatible or comparable with data collected in FY 76 (indeed, in this case they are not).

Data Base Organization. Most of the currently available HEGIS data bases (both for EDSTAT and NCHEMS in-house resources) have been reorganized from a one-data-value-per-record format (which is sometimes called NCES transactional format) into a format which contains many data elements for each institution. This reorganization process is pictured below.

	FICE	LINE (On Survey)	VALUE
Record 1	000501	104	107459
Record 2	000501	105	20742
Record 3	000501	109	806740

⇓ Reformat

FICE	VALUE 1	VALUE 2	VALUE 3
000501	107459	20742	806740

This procedure has been followed for all instruments except the Earned Degrees Conferred Data Base, where the extremely large size of the data base (i.e., number of HEGIS program codes) has forced the use of an aggregation data base where, for example, many four-digit HEGIS degree programs are aggregated and displayed as one two-digit HEGIS program. In cases where the four-digit data is required, the original NCES transactional format (or a reasonable facsimilie) is used.

In the process of reorganizing each of the HEGIS data bases, a number of institutional characteristic data elements have been added for each institution. Examples of characteristic data elements are institutional control (public/private), state in which institution exists, etc. These elements allow groups of institutions to be selected and aggregated for purposes of report generation. Thus, the modified data base format appears as follows:

	Institution	Characteristic Elements	Data Elements
Record 1	001090	xxxxxxxxxxxxx	yyyy
Record 2	001100	xxxxxxxxxxxxx	yyyy
Record 3	001105	xxxxxxxxxxxxx	yyyy

A detailed list of characteristic data elements appears in Figure 1. An important aspect of Figure 1 is that the same list of data elements has been added to every HEGIS data base. Thus, for example, institutional enrollments can be summarized using exactly the same coding classifications as earned degrees.

Coordinating Data Bases. Each of the reorganized data bases described previously has two important qualities:

- Each institution data record on each file has a FICE code associated with it.

- Each file is sorted in FICE code order.

These qualities are important from a data processing standpoint since they allow data from several files to be accessed concurrently. As each file is read subsequentially by a computer, the data records corresponding to the same institution on different files will appear in the same relative order, and hence be available for processing at the same time. This process is called file coordination and is essential to any analysis which requires information from multiple data sources.

As an example, suppose it is necessary to compute total instructional costs per FTE student. Instructional costs for institutions are found on the HEGIS-FINANCIAL CHARACTERISTICS data base, while total FTE students are found on the HEGIS-OPENING FALL ENROLLMENTS file. A pictorial diagram for computation appears below:

FINANCIAL CHARACTERISTICS			OPENING FALL ENROLLMENTS	
FICE	INSTRUCTIONAL COSTS	COMPUTED COSTS/STUDENT	FICE	FTE STUDENTS
001010	45273	-------$533-------	001010	85
001050	107945	-------$635-------	001050	170
101055	806207		001054*	270
001079	44306	$948	001055	850
001091*	1115907	$439	001079	101
001100	220407	-----$1,045-------	001100	211

* No matching FICE code on the other file.
Data values are unavailable for computing.

HEGIS Data Bases at NCHEMS. As stated previously, a number of the HEGIS data bases exist in-house for NCHEMS staff use. The current list of reorganized data bases include:

	1972-73	1973-74	1974-75
Institutional Characteristics (Accreditation)	X	X	X
Financial Characteristics	X	X	X
Opening Fall Enrollments	X	X	X
Earned Degrees Conferred	X		

In addition, the following NCES transactional data tapes are available:

	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76
Earned Degrees	X	X	X	X	X	
Financial Statistics				X	X	
Employees					X	
Opening Fall Enrollment						X
Advanced Degrees					X	X
Residence and Migration						X
Institutional Characteristics			X	X	X	X
Postsecondary Vocational Education Directory					1975	

Figure 1

Institutional Characteristics

```
 Characteristic
      Name                         Values for Characteristics

-----------------I-------------------              -------------------I
                 I                                                    I
      FICE       I  FEDERAL INTERAGENCY COMMITTEE ON EDUCATION IDENTIFICATION CODE  I
                 I    FOR POSTSECONDARY EDUCATION INSTITUTIONS        I
-----------------I----------------------------------------------------I
                 I                                                    I
      STATE      I  STATE IN WHICH THE INSTITUTION IS LOCATED         I
                 I    10 = ALABAMA            30 = MARYLAND         50 = SOUTH CAROLINA       I
                 I    11 = ALASKA             31 = MASSACHUSETTS    51 = SOUTH DAKOTA         I
                 I    12 = ARIZONA            32 = MICHIGAN         52 = TENNESSEE            I
                 I    13 = ARKANSAS           33 = MINNESOTA        53 = TEXAS                I
                 I    14 = CALIFORNIA         34 = MISSISSIPPI      54 = UTAH                 I
                 I    15 = COLORADO           35 = MISSOURI         55 = VERMONT              I
                 I    16 = CONNECTICUT        36 = MONTANA          56 = VIRGINIA             I
                 I    17 = DELAWARE           37 = NEBRASKA         57 = WASHINGTON           I
                 I    18 = DISTRICT OF COL.   38 = NEVADA           58 = WEST VIRGINIA        I
                 I    19 = FLORIDA            39 = NEW HAMPSHIRE    59 = WISCONSIN            I
                 I    20 = GEORGIA            40 = NEW JERSEY       60 = WYOMING              I
                 I    21 = HAWAII             41 = NEW MEXICO       61 = U.S. SERVICE SCHOOL  I
                 I    22 = IDAHO              42 = NEW YORK         62 = AMERICAN SAMOA       I
                 I    23 = ILLINOIS           43 = NORTH CAROLINA   63 = CANAL ZONE           I
                 I    24 = INDIANA            44 = NORTH DAKOTA     64 = GUAM                 I
                 I    25 = IOWA               45 = OHIO             65 = PUERTO RICO          I
                 I    26 = KANSAS             46 = OKLAHOMA         66 = TRUST TERR. PAC. IS. I
                 I    27 = KENTUCKY           47 = OREGON           67 = VIRGIN ISLANDS       I
                 I    28 = LOUISIANA          48 = PENNSYLVANIA                               I
                 I    29 = MAINE              49 = RHODE ISLAND                               I
-----------------I----------------------------------------------------I
                 I                                                    I
     OECODE      I  OFFICE OF EDUCATION CODE FOR POSTSECONDARY EDUCATION INSTITUTIONS  I
                 I    0 = UNASSIGNED                                  I
-----------------I----------------------------------------------------I
                 I                                                    I
    CARNCODE     I  CARNEGIE COMMISSION HIGHER EDUCATION INSTITUTIONAL CLASSIFICATION CODE  I
                 I    1.1 = RESEARCH AND DOCTORAL GRANTING UNIVERSITIES I   I
                 I    1.2 = RESEARCH AND DOCTORAL GRANTING UNIVERSITIES II  I
                 I    1.3 = DOCTORAL GRANTING UNIVERSITIES I          I
                 I    1.4 = DOCTORAL GRANTING UNIVERSITIES II         I
                 I    2.1 = COMPREHENSIVE COLLEGES AND UNIVERSITIES I I
                 I    2.2 = COMPREHENSIVE COLLEGES AND UNIVERSITIES II  I
                 I    3.1 = LIBERAL ARTS COLLEGES I                   I
-----------------I----------------------------------------------------I
```

Figure 1 (Continued)

```
  Characteristic
       Name                   Values for Characteristics

I------------------I----------------------------------------------------------------------I
I                  I                                                                      I
I                  I    DEFINITION CONTINUED                                              I
I                  I    3.2 = LIBERAL ARTS COLLEGES II                                    I
I                  I    4.1 = TWO YEAR COLLEGES AND UNIVERSITIES                          I
I                  I    5.1 = THEOLOGICAL SEMINARIES, BIBLE COLLEGES, AND OTHER INSTITUTIONS I
I                  I    OFFERING DEGREES IN RELIGION                                      I
I                  I    5.2 = MEDICAL SCHOOLS AND MEDICAL CENTERS                         I
I                  I    5.3 = OTHER SEPARATE HEALTH PROFESSIONAL SCHOOLS                  I
I                  I    5.4 = SCHOOLS OF ENGINEERING AND TECHNOLOGY                       I
I                  I    5.5 = SCHOOLS OF BUSINESS AND MANAGEMENT                          I
I                  I    5.6 = SCHOOLS OF ART, MUSIC, DESIGN, ETC.                         I
I                  I    5.7 = SCHOOL OF LAW                                               I
I                  I    5.8 = TEACHERS COLLEGES                                           I
I                  I    5.9 = OTHER SPECIALIZED INSTITUTIONS                              I
I                  I    0 = NONE OF THE ABOVE                                             I
I------------------I----------------------------------------------------------------------I
I                  I                                                                      I
I     INSTNAME     I  NAME OF INSTITUTION                                                 I
I------------------I----------------------------------------------------------------------I
I                  I                                                                      I
I     REGION4      I  OFFICE OF EDUCATION REGION CODE                                     I
I                  I     1 = NORTH ATLANTIC (CONN, DEL, DC, ME, MD, MASS, NH, NJ, NY, PENN, I
I                  I     RI, VT)                                                          I
I                  I     2 = GREAT LAKES AND PLAINS (ILL, IND, IO, KS, MICH, MINN, MO, NEB, I
I                  I     ND, OH, SD, WIS)                                                 I
I                  I     3 = SOUTHEAST (ALA, ARK, FLA, GA, KY, LA, MISS, NC, SC, TENN, VA, I
I                  I     WVA)                                                             I
I                  I     4 = WEST AND SOUTHWEST (AK, AZ, CAL, COL, HI, ID, MONT, NEV, NM, OK, I
I                  I     ORE, TX, UT, WA, WY)                                             I
I                  I     5 = US SERVICE SCHOOLS                                           I
I                  I     6 = (NOT IN USE)                                                 I
I                  I     7 = OUTLYING AREAS (AMER. SAMOA, CANAL ZONE, GUAM, PUERTO RICO,   I
I                  I     TRUST TERR. PAC. IS., VIRGIN ISLANDS)                            I
I------------------I----------------------------------------------------------------------I
I                  I                                                                      I
I     REGION8      I  OFFICE OF EDUCATION REGION CODE                                     I
I                  I     1 = NEW ENGLAND (CONN, ME, MASS, NH, RI, VT)                     I
I                  I     2 = MIDDLE EAST (DEL, DC, MD, NJ, NY, PA)                        I
I                  I     3 = GREAT LAKES (ILL, IND, MICH, OH, WIS)                        I
I                  I     4 = PLAINS (IO, KS, MINN, MO, NEB, ND, SD)                       I
I                  I     5 = SOUTHEAST (ALA, ARK, FLA, GA, KY, LA, MISS, NC, SC, TENN, VA, I
I------------------I----------------------------------------------------------------------I
```

Figure 1 (Continued)

Characteristic Name	Values for Characteristics
	DEFINITION CONTINUED WVA) 6 = SOUTHWEST (AZ, NM, OK, TX) 7 = ROCKY MOUNTAINS (COL, ID, MONT, UT, WY) 8 = FAR WEST (AK, CAL, HI, NEV, ORE, WA) 9 = OUTLYING AREAS (AMERICAN SAMOA, CANAL ZONE, GUAM, PUERTO RICO, TRUST TERR, PAC. IS., VIRGIN ISLANDS) 0 = US SERVICE SCHOOLS
RACE	PREDOMINANT RACE OF STUDENTS AT THE INSTITUTION 0 = NOT REPORTED 1 = WHITE 2 = NEGRO
CONTROL	TYPE OF INSTITUTIONAL CONTROL 0 = NOT REPORTED 1 = PUBLIC 2 = PRIVATE
TYPE	OFFICE OF EDUCATION INSTITUTIONAL TYPE 0 = NOT REPORTED 1 = UNIVERSITY 2 = OTHER 4 YEAR 3 = 2 YEAR
SEX	SEX OF STUDENTS AT THE INSTITUTION 0 = NOT REPORTED 1 = MALE 2 = FEMALE 3 = COED 4 = COORDINATE

Figure 1 (Continued)

```
Characteristic
     Name                         Values for Characteristics

I------------------I---------------------------------------------------------------------------I
I                  I                                                                           I
I      REGACC      I  REGIONAL ACCREDITATION                                                   I
I                  I    0 = NONE                                                               I
I                  I    1 = NEW ENGLAND ASSOCIATION OF COLLEGES AND SECONDARY SCHOOLS          I
I                  I    2 = MIDDLE STATES ASSOCIATION OF COLLEGES AND SECONDARY SCHOOLS,       I
I                  I    COMMISSION ON INSTITUTIONS OF HIGHER EDUCATION                         I
I                  I    3 = NORTH CENTRAL ASSOCIATION OF COLLEGES AND SECONDARY SCHOOLS,       I
I                  I    COMMISSION ON COLLEGES AND UNIVERSITIES                                I
I                  I    4 = NORTHWEST ASSOCIATION OF SECONDARY AND HIGHER SCHOOLS,             I
I                  I    COMMISSION ON HIGHER SCHOOLS                                           I
I                  I    5 = SOUTHERN ASSOCIATION OF COLLEGES AND SCHOOLS                       I
I                  I    6 = WESTERN ASSOCIATION OF SCHOOLS AND COLLEGES,                       I
I                  I    ACCREDITING COMMISSION FOR SENIOR COLLEGES AND UNIVERSITIES            I
I                  I    AND ACCREDITING COMMISSION FOR JUNIOR COLLEGES                         I
I------------------I---------------------------------------------------------------------------I
I                  I                                                                           I
I      DEGGRNT     I  WHETHER DEGREE-GRANTING                                                  I
I                  I    0 = NO                                                                 I
I                  I    1 = YES                                                                I
I------------------I---------------------------------------------------------------------------I
I                  I                                                                           I
I     HIGHLEVEL    I  HIGHEST LEVEL OF OFFERING                                                I
I                  I    0 = NOT REPORTED                                                       I
I                  I    3 = TWO BUT LESS THAN 4 YEARS                                          I
I                  I    4 = FOUR-OR FIVE-YEAR BACCALAUREATE                                    I
I                  I    5 = FIRST-PROFESSIONAL DEGREE                                          I
I                  I    6 = MASTER'S                                                           I
I                  I    7 = BEYOND MASTER'S BUT LESS THAN DOCTORATE                            I
I                  I    8 = DOCTORATE                                                          I
I                  I    9 = UNDERGRADUATE NON-DEGREE-GRANTING                                  I
I                  I    10 = GRADUATE NON-DEGREE-GRANTING                                      I
I                  I    11 = POST-DOCTORAL RESEARCH ONLY                                       I
I------------------I---------------------------------------------------------------------------I
I                  I                                                                           I
I      COUNTY      I  COUNTY CODE (FROM THE WORLDWIDE GEOGRAPHIC LOCATION CODE                 I
I                  I    GOVERNMENT SERVICES ADMINISTRATION, OFFICE OF FINANCE, FEBRUARY 1972)  I
I                  I    0 = NOT REPORTED                                                       I
I------------------I---------------------------------------------------------------------------I
```

Figure 1 (Continued)

Characteristic Name	Values for Characteristics
CONGDIST	CONGRESSIONAL DISTRICT CODE (92ND CONGRESS) 0 = NOT REPORTED
CALSYS	CALENDAR SYSTEM 0 = NOT REPORTED 1 = SEMESTER 2 = QUARTER 3 = TRIMESTER 4 = OTHER
STATEACC	ACCREDITED BY ONE OR MORE STATE AGENCIES 0 = NO 1 = YES
CONTINST	INSTITUTIONAL CONTROL OR AFFILIATION 00 = NOT REPORTED 11 = FEDERAL 12 = STATE 13 = LOCAL 14 = STATE/LOCAL 15 = STATE RELATED 21 = INDEPENDENT NON-PROFIT MAKING 25 = ORGANIZED AS PROFIT MAKING NN = PRIVATE - AFFILIATED WITH RELIGIOUS GROUP
PROG OCCUP	INSTITUTION OFFERS OCCUPATIONAL TRAINING PROGRAMS 0 = NO 1 = YES

Figure 1 (Continued)

Characteristic Name	Values for Characteristics
PROG TWOYR	INSTITUTION OFFERS TWO-YEAR PROGRAM 0 = NO 1 = YES
PROG LIBART	INSTITUTION OFFERS LIBERAL ARTS PROGRAM 0 = NO 1 = YES
PROG TEACH	INSTITUTION OFFERS TEACHERS' PROGRAM 0 = NO 1 = YES
PROG PROF	INSTITUTION OFFERS PROGESSIONAL PROGRAMS 0 = NO 1 = YES
ENROLCODE	ENROLLMENT CODE 0 = ENROLLMENT NOT REPORTED 1 = 1 - 199 2 = 200 - 499 3 = 500 - 999 4 = 1000 - 2499 5 = 2500 - 4999 6 = 5000 - 9999 7 = 10000 - 19999 8 = 20000 - NN
ENROLCURR	ENROLLMENT FOR CURRENT YEAR 0 = NOT REPORTED

On the following pages are six HEGIS survey instruments. In each cell of the survey instrument, a component number is shown (for example, 496). The component numbers are the names, as defined to the MARK IV data management system, of the data elements on the data bases available in-house. The component numbers are also the names, as defined to the SYSTEM 2K system, of the data elements on data bases maintained on the EDSTAT system. To access the process data from the data bases, the component numbers must be referenced when making a request to either MARK IV or SYSTEM 2K.

The component numbers with asterisks are the sums of other elements. For example, from Opening Fall Enrollments for 1970-74, the element (221 - total degree-credit undergraduates) is the sum of C201 (lower-division undergraduates) and C211 (upper-division undergraduates).

BI Bible College Education *(3-year institutions, 4- and 5-year colleges)*
C102 Accrediting Association of Bible Colleges

C103 **MAE** Medical Asst. Education *(private schools or programs)*

C104 **MLT** Medical Laboratory Technician Education
Accrediting Bureau of Medical Laboratory Schools

C105 **JRCB** Business *(private junior colleges)*
SRCB Business *(private senior colleges)*
C106 Association of Independent Colleges and Schools

HA Hospital Administration *(graduate degree programs)*
Accrediting Commission on Graduate Education for Hospital
C107 Administration

BUS Business *(baccalaureate and master's degree programs)*
C108 American Assembly of Collegiate Schools of Business

ANEST Nurse Anesthesia *(professional schools)*
C109 American Association of Nurse Anesthetists

THEOL Theology *(graduate professional schools)*
C110 American Association of Theological Schools

LAW Law *(professional schools)*
C111 American Bar Association

FUSER Funeral Service Education *(independent schools, collegiate departments)*
C112 American Board of Funeral Service Education

CHEM Chemistry *(baccalaureate professional programs)*
C113 American Chemical Society

JOUR Journalism *(baccalaureate professional programs)*
C114 American Council on Education for Journalism

PHAR Pharmacy *(professional schools)*
C115 American Council on Pharmaceutical Education

C116 **DA** Dental Assisting
C117 **DH** Dental Hygiene
C118 **DENT** Dentistry *(programs leading to DDS or DMD degrees and Dental Specialties)*
DT Dental Laboratory Technician Education
C119 American Dental Association

LIB Librarianship *(master's degree programs)*
C120 American Library Association

C121 **APCP** Assistant to the Primary Care Physician Education
C122 **CLA** Certified Laboratory Technician Education
C123 **CYTO** Cytotechnology
C124 **HT** Histologic Technician Education
C125 **MA** Medical Assistant Education
C127 **MLTE** Medical Laboratory Technician Education
C128 **MRA** Medical Record Administrators
C129 **MRT** Medical Record Technician Education
C130 **MT** Medical Technology
C131 **NMT** Nuclear Medicine Technologist or Technician Education
C132 **OT** Occupational Therapy
C133 **PT** Physical Therapy
C135 **RESTH** Respiratory (*Inhalation*) Therapy
C136 **RT** Radiologic Technology
C137 **RTT** Radiation Therapy Technology
SBBT Specialist in Blood Bank Technology Education
C138 American Medical Association, Council on Medical Education

C139 **MED-B** Medical Sciences, Basic *(programs leading to M.D. degree)*
MED Medicine *(programs leading to M.D. degree)*
C140 American Medical Association and Association of American Medical Colleges, Liaison Committee on Medical Education

OPT Optometry *(professional schools)*
C141 American Optometric Association

OSTEO Osteopathic Medicine *(programs leading to D.O. degree)*
C142 American Osteopathic Association

POD Podiatry *(baccalaureate and professional programs)*
C143 American Podiatry Association

C144 **CLPSY** Psychology, Clinical *(doctoral programs only)*
COPSY Psychology, Counseling *(doctoral programs only)*
C145 American Psychological Association

PH Public Health *(master's degree program in community health education and graduate professional schools of public health)*
C146 American Public Health Association

LDAR Landscape Architecture *(first professional degree programs)*
C147 American Society of Landscape Architects

C148 **AUD** Audiology *(master's degree programs)*
SP Speech Pathology *(master's degree programs)*
C149 American Speech and Hearing Association

VET Veterinary Medicine *(professional programs leading to DVM or VMD degrees)*
C150 American Veterinary Medical Association

SW Social Work *(graduate professional schools)*
C151 Council on Social Work Education

C152 **ENG** Engineering *(first professional degree curriculums)*
TECH Engineering Technology
C153 Engineers Council for Professional Development

ARCH Architecture *(professional schools)*
C154 National Architectural Accrediting Board

PNE Nursing *(practical nurse programs)*
C155 National Association for Practical Nurse Education and Service

ART Art *(professional schools)*
C156 National Association of Schools of Art

MUS Music *(baccalaureate and graduate degree programs)*
C157 National Association of Schools of Music

TED Teacher Education *(baccalaureate and graduate degree program*
C158 National Council for the Accreditation of Teacher Education

C159 **ADNUR** Nursing *(associate degree program)*
C160 **NUR** Nursing *(baccalaureate and master's degree program)*
PN Nursing *(practical nurse programs)*
C161 National League for Nursing

FOR Forestry *(professional schools)*
C162 Society of American Foresters

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Opening Fall Enrollments

(1970-1974)

(Before completing this form, PLEASE read the instructions to the RIGHT.) **I. DEGREE-CREDIT STUDENTS** *(In programs wholly or chiefly creditable toward a bachelor's or higher degree)*	LINE NO.	HEADCOUNT					FULL-TIME EQUIVALENT OF TOTAL HEADCOUNT
		MEN		WOMEN		TOTAL (5)	
		FULL-TIME (1)	PART-TIME (2)	FULL-TIME (3)	PART-TIME (4)		(6)
A. RESIDENT STUDENTS							
1. UNDERGRADUATES							
a. Lower Division	01	C201	C202	C203	C204	*C205*	C206
b. Upper Division	02	C211	C212	C213	C214	*C215*	C216
c. *TOTAL* Degree-credit undergraduates *(Sum of lines 01 and 02)*	03	*C221*	*C222*	*C223*	*C224*	*C225*	*C226*
2. UNCLASSIFIED STUDENTS	04	C231	C232	C233	C234	*C235*	C236
3. FIRST-PROFESSIONAL STUDENTS	05	C241	C242	C243	C244	*C245*	C246
4. GRADUATE STUDENTS	06	C251	C252	C253	C254	*C255*	C256
5. *TOTAL* Degree-credit resident students *(Sum of lines 03 through 06)*	07	*C261*	*C262*	*C263*	*C264*	*C265*	C266
B. EXTENSION STUDENTS							
1. UNDERGRADUATE LEVEL	08		C271		C272	*C273*	C274
2. UNCLASSIFIED	09		C281		C282	*C283*	C284
3. GRADUATE OR FIRST-PROFESSIONAL LEVEL	10		C291		C292	*C293*	C294
4. *TOTAL* Degree-credit extension students *(Sum of lines 08, 09, and 10)*	11		*C301*		*C302*	*C303*	*C304*
C. *TOTAL* RESIDENT AND EXTENSION ENROLLMENT IN DEGREE-CREDIT PROGRAMS *(Sum of lines 07 & 11)*	12	*C311*	*C312*	*C313*	*C314*	*C315*	*C316*
➡ **D. FIRST-TIME DEGREE-CREDIT STUDENTS**	13	C321	C322	C323	C324	*C325*	C326
II. NON-BACHELOR'S-DEGREE-CREDIT STUDENTS *(In organized occupational programs of less than 4 years, not chiefly creditable toward a bachelor's degree)*							
A. RESIDENT STUDENTS	14	C331	C332	C333	C334	*C335*	C336
B. EXTENSION STUDENTS	15		C341		C342	*C343*	C344
C. *TOTAL* RESIDENT AND EXTENSION ENROLLMENT IN NON-BACHELOR'S-DEGREE-CREDIT PROGRAMS *(Sum of lines 14 and 15)*	16	*C351*	*C352*	*C353*	*C354*	*C355*	*C356*
➡ **D. FIRST-TIME NON-BACHELOR'S-DEGREE-CREDIT STUDENTS**	17	C361	C362	C363	C364	*C365*	C366
III. GRAND TOTAL *(Sum of lines 12 and 16)*	18	C371	C372	C373	C374	C375	C376

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Opening Fall Enrollments

(1974-1975)

Name of Institution	Institution Code Number	Due Date November 1, 1974

PLEASE read the instructions and definitions on the next -- before completing this questionnaire.	LINE NO.	HEADCOUNT					FULL-TIME EQUIVALENT OF PART-TIME HEADCOUNT
		MEN		WOMEN		TOTAL (5)	
ALL STUDENTS ENROLLED *(resident and extension)*		FULL-TIME (1)	PART-TIME (2)	Full- (3)	Part- (4)		
FIRST-TIME STUDENTS *(entering freshmen)*							
1. IN BACHELOR'S-DEGREE-CREDIT PROGRAMS *(Also included on line 03 below)*	01	C401	C402	C403	C404	*C405*	C406
2. IN NON-BACHELOR'S-DEGREE-CREDIT PROGRAMS *(Also included on line 04 below)*	02	C411	C412	C413	C414	*C415*	C416
UNDERGRADUATES							
1. LOWER DIVISION UNDERGRADUATES							
a. In Bachelor's-Degree-Credit programs *(Includes students reported on line 01 above)*	03	C421	C422	C423	C424	*C425*	C426
b. In Non-Bachelor's-Degree-Credit Programs *(Includes students reported on line 02 above)*	04	C431	C432	C433	C434	*C435*	C436
2. UPPER DIVISION UNDERGRADUATES	05	C441	C442	C443	C444	*C445*	C446
3. TOTAL UNDERGRADUATES *(sum of lines 03, 04, and 05)*	06	*C451*	*C452*	*C453*	*C454*	*C455*	*C456*
. UNCLASSIFIED STUDENTS	07	C461	C462	C463	C464	*C465*	C466
. FIRST-PROFESSIONAL STUDENTS	08	C471	C472	C473	C474	*C475*	C476
E.Graduate Students	09	C481	C482	C483	C484	*C485*	C486
. GRAND TOTAL - ALL STUDENTS IN SURVEY *(sum of lines 06 through 09)*	10	C491	C492	C493	C494	C495	C496

IF THE EDUCATIONAL PROGRAM AT YOUR INSTITUTION HAS CHANGED DURING THE PAST YEAR SO THAT THIS YEAR'S FALL ENROLLMENT REPORT IS SIGNIFICANTLY DIFFERENT FROM THE REPORT SUBMITTED IN FALL 1973, PLEASE EXPLAIN THE DIFFERENCES.

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FINANCE 1972-73

Part A - Current Funds Revenues by Source

SOURCE	LINE NO.	AMOUNT (whole dollars only)	SOURCE	LINE NO.	AMOUNT (whole dollars only)
I. EDUCATIONAL AND GENERAL REVENUES - TOTAL *(sum of lines 2, 3, 9, 10, 11, 18, 19, 26, 29, 30, and 31)*	1	$ C601	H. RECOVERY OF INDIRECT COSTS *(sum of lines 27 and 28)*	26	$ *C646*
A. STUDENT TUITION AND FEES	2	C602	1. SPONSORED RESEARCH	27	C647
B. GOVERNMENTAL APPROPRIATIONS *(sum of lines 4, 7, and 8)*	3	$ *C606*	2. OTHER SPONSORED PROGRAMS	28	C648
1. FEDERAL GOVERNMENT *(sum of lines 5, and 6)*	4	$ *C607*	I. SALES AND SERVICES OF EDUCATIONAL DEPARTMENTS	29	C649
a. FEDERAL PAYMENTS RECEIVED THROUGH STATE CHANNELS	5	C608	J. ORGANIZED ACTIVITIES RELATED TO EDUCATIONAL DEPARTMENTS	30	C650
b. ALL OTHER FEDERAL APPROPRIATIONS	6	C609	K. OTHER SOURCES	31	C651
2. STATE GOVERNMENT	7	C610	**II. STUDENT AID GRANTS - TOTAL** *(sum of lines 33 through 38)*	32	$ *C656*
3. LOCAL GOVERNMENT	8	C611	A. FEDERAL GOVERNMENT	33	C657
C. ENDOWMENT INCOME	9	C612	B. STATE GOVERNMENT	34	C658
D. PRIVATE GIFTS	10	C613	C. LOCAL GOVERNMENT	35	C659
E. SPONSORED RESEARCH *(sum of lines 12, 13, 14, and 15)*	11	$ *C621*	D. PRIVATE GIFTS AND GRANTS	36	C660
1. FEDERAL GOVERNMENT	12	C622	E. ENDOWMENT INCOME	37	C661
2. STATE GOVERNMENT	13	C623	F. OTHER STUDENT AID GRANTS	38	C662
3. LOCAL GOVERNMENT	14	C624	**III. MAJOR SERVICE PROGRAMS - TOTAL** *(sum of lines 40 and 44)*	39	$ *C666*
4. NONGOVERNMENTAL *(sum of lines 16 and 17)*	15	$ *C625*	A. HOSPITALS *(sum of lines 41, 42, and 43)*	40	$ *C667*
a. PHILANTHROPIC	16	C626	1. HOSPITAL CHARGES	41	C668
b. OTHER NONGOVERNMENTAL	17	C627	2. FEDERAL FUNDS FOR HOSPITALS	42	C669
F. OTHER SEPARATELY BUDGETED RESEARCH	18	C628	3. OTHER HOSPITAL REVENUES	43	C670
G. OTHER SPONSORED PROGRAMS *(sum of lines 20 through 23)*	19	$ *C636*	B. OTHER SERVICE PROGRAMS *	44	C671
1. FEDERAL GOVERNMENT	20	C637	**IV. AUXILIARY ENTERPRISES - TOTAL** *(sum of lines 46 and 47)*	45	$ *C676*
2. STATE GOVERNMENT	21	C638	A. HOUSING AND FOOD SERVICES	46	C677
3. LOCAL GOVERNMENT	22	C639	B. OTHER AUXILIARY ENTERPRISES	47	C678
4. NONGOVERNMENTAL *(sum of lines 24 and 25)*	23	$ *C640*	**V. TOTAL CURRENT FUNDS REVENUES - GRAND TOTAL** *(sum of lines 1, 32, 39, and 45)*	48	$ C685
a. PHILANTHROPIC	24	C641			
b. OTHER NONGOVERNMENTAL	25	C642			

*Please attach a list of the names of Federally Funded Research and Development Centers for which these revenues were received.

PART B - CURRENT FUNDS EXPENDITURES AND ALL EXPENDITURES FOR CAPITAL OUTLAY *(ALL FUNDS)* BY FUNCTION

FUNCTION (1)	LINE NO.	CURRENT FUNDS EXPENDITURES (2)	EXPENDITURES FOR CAPITAL OUTLAY *(from all funds other than current funds)* PURCHASE OF EQUIPMENT (3)	PURCHASE OF LAND AND BUILDINGS (4)	CONSTRUCTION (5)
I. EDUCATIONAL AND GENERAL EXPENDITURES - TOTAL *(sum of lines 2 through 10)*	1	$ C691	$ C692	$ C693	$ C694
A. INSTRUCTION AND DEPARTMENTAL RESEARCH	2	C695			
B. ORGANIZED ACTIVITIES RELATED TO EDUCATIONAL DEPARTMENTS	3	C696			
C. SPONSORED RESEARCH	4	C697			
D. OTHER SEPARATELY BUDGETED RESEARCH	5	C698			
E. OTHER SPONSORED PROGRAMS	6	C699			
F. EXTENSION AND PUBLIC SERVICE	7	C700			
G. LIBRARIES	8	C701			
H. PHYSICAL PLANT MAINTENANCE AND OPERATION	9	C702			
I. OTHER EDUCATIONAL AND GENERAL	10	C703			
II. STUDENT AID GRANTS	11	$ C710			
I. MAJOR SERVICE PROGRAMS - TOTAL *(sum of lines 13 and 14)*	12	$ *C716*			
A. HOSPITALS	13	C717	C718	C719	C720
B. OTHER SERVICE PROGRAMS	14	C721	C722	C723	C724
IV. AUXILIARY ENTERPRISES - TOTAL *(sum of lines 16 and 17)*	15	$ *C731*	$ C732	$ C733	$ C734
A. HOUSING AND FOOD SERVICES	16	C735			
B. OTHER AUXILIARY ENTERPRISES	17	C736			
V. TOTAL CURRENT FUNDS EXPENDITURES - GRAND TOTAL *(sum of lines 1, 11, 12, and 15)*	18	$ C740			
ESTIMATE OF AMOUNT ON LINE 18 EXPENDED FOR PHYSICAL PLANT ASSETS	19	$ C746	C747	C748	C749
ESTIMATE OF AMOUNT ON LINE 18 EXPENDED FOR AGRICULTURAL EXPERIMENT STATIONS AND EXTENSION SERVICES	20	$ C750	$ C751	$ C752	$ C753

PART C - PHYSICAL PLANT ASSETS FOR FISCAL YEAR ENDING 1972

TYPE OF ASSET (1)	LINE NO.	BOOK VALUE AT BEGINNING OF YEAR (2)	ADDITIONS DURING YEAR (3)	DEDUCTIONS DURING YEAR (4)	BOOK VALUE AT END OF YEAR (5)
AND	1	$ C761	$ C762	$ C763	$ C764
BUILDINGS	2	C765	C766	C767	C768
EQUIPMENT	3	C769	C770	C771	C772

PART D - INDEBTEDNESS ON PHYSICAL PLANT

BALANCE AND TRANSACTION	LINE NO.	AMOUNT (*whole dollars only*)
BALANCE OWED ON PRINCIPAL AT BEGINNING OF YEAR	1	$ C776
ADDITIONAL PRINCIPAL BORROWED DURING THE YEAR	2	C777
PAYMENTS MADE ON PRINCIPAL DURING THE YEAR	3	C778
BALANCE OWED ON PRINCIPAL AT END OF YEAR (*line 1, plus line 2, minus line 3*)	4	$ *C779*

PART E - ENDOWMENT BY BOOK AND MARKET VALUES, EARNINGS, AND REALIZED GAINS FOR FISCAL YEAR ENDING 1972

BALANCE AND TRANSACTION	LINE NO.	AMOUNT (*whole dollars only*)
VALUE OF ENDOWMENT AT THE BEGINNING OF THE FISCAL YEAR		
a. BOOK VALUE	1	$ C786
b. MARKET VALUE	2	$ C787
VALUE OF ENDOWMENT AT THE END OF THE FISCAL YEAR		
a. BOOK VALUE	3	$ C788
b. MARKET VALUE	4	$ C789
ENDOWMENT EARNINGS (*dividends, interest, rents, etc.*)	5	$ C790
NET REALIZED GAINS OR LOSSES ON SALE OF INVESTMENTS	6	$ C791

PART F - TO BE COMPLETED BY *PUBLIC* INSTITUTIONS ONLY

ITEM	LINE NO.	AMOUNT (*whole dollars only*)
I. REVENUES (*all funds*) A. ALL PRIVATE GIFTS	1	$
B. EARNINGS ON INVESTMENTS	2	
II. EXPENDITURES (*all funds*) A. PERSONAL SERVICES (*gross salaries and wages*)	3	
B. SCHOLARSHIPS AND PRIZES	4	
C. INTEREST ON DEBT PAID FROM ALL FUNDS (*enter amount here*) → If Part B includes any expenditures for interest, enter total amount here → ☐	5	
III. DEBT OUTSTANDING, ISSUED, AND RETIRED A. NONGUARANTEED LONG-TERM DEBT 1. TOTAL OUTSTANDING AT BEGINNING OF FISCAL YEAR	6	
2. TOTAL ISSUED DURING FISCAL YEAR	7	
3. TOTAL RETIRED DURING FISCAL YEAR	8	
4. *TOTAL OUTSTANDING AT END OF FISCAL YEAR (line 6 plus, line 7, minus line 8)*	9	$
B. SHORT-TERM (*interest-bearing*) DEBT 1. AMOUNT OUTSTANDING AT BEGINNING OF FISCAL YEAR	10	$
2. AMOUNT OUTSTANDING AT END OF FISCAL YEAR	11	

IV. CASH AND SECURITY HOLDINGS AT END OF FISCAL YEAR

TYPE OF ASSET (*1*)	LINE NO.	AMOUNT AT END OF FISCAL YEAR HELD IN SINKING FUNDS (*see definitions*) (*2*)	HELD IN BOND FUNDS (*see definitions*) (*3*)	HELD IN ALL OTHER FUNDS, EXCEPT FOR ANY EMPLOYEE-RETIREMENT FUND (*4*)
A. CASH AND DEPOSITS	12	$	$	$
B. FEDERAL SECURITIES - U.S. TREASURY OBLIGATIONS	13			
C. STATE AND LOCAL GOVERNMENT SECURITIES	14			
D. OTHER SECURITIES	15			
E. *TOTAL (sum of lines 12 through 15)*	16	$	$	$

NOTE: Use attachments for comments, supplemental information, etc.

FINANCE 1974-75

PART A - CURRENT FUNDS REVENUES BY SOURCE FOR FISCAL YEAR ENDING 1975

SOURCE		LINE NO.	AMOUNT *(whole dollars)*
TUITION AND FEES		1	$ C602
GOVERNMENT APPROPRIATIONS			
FEDERAL TOTAL →		2	C607
through State channels → $			
STATE		3	C610
LOCAL		4	C611
GOVERNMENT GRANTS & CONTRACTS			
FEDERAL	UNRESTRICTED	5	C841
	RESTRICTED	6	C842
STATE	UNRESTRICTED	7	C843
	RESTRICTED	8	C844
LOCAL	UNRESTRICTED	9	C845
	RESTRICTED	10	C846
PRIVATE GIFTS, GRANTS AND CONTRACTS	UNRESTRICTED	11	C613
	RESTRICTED	12	C851
ENDOWMENT INCOME	UNRESTRICTED	13	C612
	RESTRICTED	14	C661
SALES AND SERVICES OF EDUCATIONAL ACTIVITIES		15	C861
SALES AND SERVICES OF AUXILIARY ENTERPRISES		16	C676
SALES AND SERVICES OF HOSPITALS		17	C667
OTHER SOURCES		18	C871
INDEPENDENT OPERATIONS		19	C872
TOTAL CURRENT FUNDS REVENUES *(sum of Lines 1 through 19)*		20	$ C685

NOTE: IF IN THE PRECEDING YEAR gifts were received which were credited directly to the balances of funds other than the current fund and which under present accounting practices would be included in current funds revenues, indicate the amount of such gifts RECEIVED IN THE PRECEDING YEAR and added directly to balances of other funds.

21	AMOUNT $ C881

PART B - CURRENT FUNDS EXPENDITURES AND MANDATORY TRANSFERS FOR FISCAL YEAR ENDING 1975

FUNCTION	LINE NO.	AMOUNT *(whole dollars)*
EDUCATIONAL AND GENERAL		
INSTRUCTION	1	$ C901
RESEARCH	2	C902
PUBLIC SERVICE	3	C700
ACADEMIC SUPPORT TOTAL →	4	C903
includes libraries of	5	$ C701
STUDENT SERVICES	6	C905
INSTITUTIONAL SUPPORT	7	C906
OPERATION AND MAINTENANCE OF PLANT	8	C702
SCHOLARSHIPS AND FELLOWSHIPS		
AWARDS FROM UNRESTRICTED FUNDS	9	C911
AWARDS FROM RESTRICTED FUNDS	10	C912
EDUCATIONAL AND GENERAL MANDATORY TRANSFERS	11	C913
TOTAL EDUCATIONAL AND GENERAL EXPENDITURES AND MANDATORY TRANSFERS (sum of Lines 1 through 4, and Lines 6 through 11)	12	C915
AUXILIARY ENTERPRISES →	14	C921
includes mandatory transfers of →	13	$ C922
HOSPITALS →	16	C923
includes mandatory transfers of →	15	$ C924
INDEPENDENT OPERATIONS →	18	C925
includes mandatory transfers of →	17	$ C926
TOTAL EXPENDITURES AND MANDATORY TRANSFERS *(sum of Lines 12, 14, 16, and 18)*	19	$ C930

PART C - PHYSICAL PLANT ASSETS FOR FISCAL YEAR ENDING 1975

TYPE OF ASSET *(1)*	LINE NO.	BOOK VALUE AT BEGINNING OF YEAR *(2)*	ADDITIONS DURING YEAR *(3)*	DEDUCTIONS DURING YEAR *(4)*	BOOK VALUE AT END OF YEAR *(5)*	CURRENT REPLACEMENT VALUE *(6)*
LAND	1	$ C761	$ C762	$ C763	$ C764	
BUILDINGS	2	C765	C766	C767	C768	$ C773
EQUIPMENT	3	C769	C770	C771	C772	

PART D - INDEBTEDNESS ON PHYSICAL PLANT FOR FISCAL YEAR 1975

1. INSTITUTION CODE NUMBER

BALANCE AND TRANSACTION	LINE NO.	AMOUNT *(whole dollars only)*	
BALANCE OWED ON PRINCIPAL AT BEGINNING OF YEAR	1	$ C776	
ADDITIONAL PRINCIPAL BORROWED DURING YEAR	2	C777	
PAYMENTS MADE ON PRINCIPAL DURING THE YEAR	3	C778	
BALANCE OWED ON PRINCIPAL AT END OF YEAR *(Line 1, plus Line 2, minus Line 3)*	4	$ C779	
INTEREST PAYMENTS ON PHYSICAL PLANT INDEBTEDNESS	5	$ C780	

PART E - DETAILS OF ENDOWMENT FOR FISCAL YEAR ENDING 1975

BALANCE AND TRANSACTION	LINE NO.	BOOK VALUE *(1)*	MARKET VALUE *(2)*
VALUE OF ENDOWMENT AT THE BEGINNING OF THE FISCAL YEAR	1	$ C786	$ C787
TOTAL ADDITIONS FOR THE FISCAL YEAR	2	C792	C793
TOTAL WITHDRAWALS FOR THE FISCAL YEAR	3	C794	C795
NET REALIZED GAINS/*(losses)* ON SALE OF INVESTMENTS *(Book Value ONLY)*	4	C791	
APPRECIATION/*(depreciation)* FOR THE YEAR *(Market Value ONLY)*	5		C796
VALUE OF ENDOWMENT AT THE END OF THE FISCAL YEAR	6	C788	C789
ENDOWMENT YIELD (dividends, interest, rents, royalties, etc.)	7	AMOUNT →	$ C790

PART F - STATEMENT OF CHANGES IN FUND BALANCES FOR FISCAL YEAR ENDING 1975

	LINE NO.	CURRENT FUNDS *(1)*	LOAN FUNDS *(2)*	ENDOWMENT FUNDS *(3)*	ANNUITY AND LIFE INCOME FUNDS *(4)*	PLANT FUNDS *(5)*
ADDITIONS	1	$ C801	$ C802	$ C803	$ C804	$ C805
DEDUCTIONS	2	C806	C807	C808	C809	C810
TOTAL TRANSFERS INTO/ (OUT OF)	3	C811	C812	C813	C814	C815
SUMMARY						
NET INCREASE *(DECREASE)* FOR YEAR	4	C816	C817	C818	C819	C820
FUND BALANCE AT BEGINNING OF YEAR	5	C821	C822	C823	C824	C825
FUND BALANCE AT END OF YEAR	6	C826	C827	C828	C829	C830

Figure-2 - Earned Degrees - (1970-1976)

NAME OF INSTITUTION	1. INSTITUTION CODE NUMBER

INSTRUCTIONS FOR PART A: FIRST-PROFESSIONAL DEGREES CONFERRED IN SELECTED FIELDS, 1971-72

Only the 8 professions listed below should be reported in Part A. Within these professions, report **first-professional** degrees only. A first-professional degree is defined herein as one which meets all three of the following criteria:

(1) it signifies completion of the academic requirements to begin practice in the profession; (2) it is based on a program which requires at least 2 years of college work prior to entrance; and (3) a total of at least 6 academic years of college work is required to complete the degree program, including prior required college work plus the length of the professional curriculum itself.

The "Other" category is to be used only in the event that there are first-professional degrees within the 8 professions other than those specifically named in connection with those professions.

For each of the 8 disciplines, degrees other than first-professional are to be reported in Part B.

The TOTAL line (line 14) should show the sums of all entries in columns 4 and 5.

PART A: FIRST-PROFESSIONAL DEGREES CONFERRED IN SELECTED FIELDS *(Requiring at least six years of study)*

IS PART A APPLICABLE TO YOUR INSTITUTION? ☐ YES ☐ NO
(If not applicable, proceed to Parts B and C.)

CODE *(1)*	DISCIPLINE SPECIALTY *(major field of study)* *(2)*	Total	LINE NO. *(Circle if new this year)* *(3)*	NUMBER OF FIRST-PROFESSIONAL DEGREES CONFERRED: MEN *(4)*	WOMEN *(5)*
1204	Dentistry, D.D.S. or D.M.D. degree	*C803*	1	C801	C802
1206	Medicine, M.D. degree	*C806*	2	C804	C805
1209-1	Optometry [O.D. degree. Report all other optometry in Part B.]	*C809*	3	C807	C808
1210	Osteopathic medicine, D.O. degree	*C812*	4	C810	C811
1216-1	Podiatry *(Pod.D. or D.P.)* or podiatric medicine *(D.P.M.)* [Include chiropody.]	*C815*	5	C813	C814
1218	Veterinary medicine *(D.V.M. degree)*	*C818*	6	C816	C817
1401-1	Law, general [LL.B. or J.D. degree. Report all other law in Part B.]	*C821*	7	C819	C820
2301-1	Theological professions, general [B.D., M.Div., Rabbi, or other first-professional degree. Report all other theology in Part B.]	*C824*	8	C822	C823
9799	Other, specify	*C827*	9	C825	C826
9799			10		
9799			11		
9799			12		
9799			13		
9700	TOTAL *(Sum of lines 1 thru 13)*	C830	14	C828	C829

OE FORM 2300–2.1, 3/72

Part B: Bachelor's, Master's, and Doctor's Degrees

		Bachelors			Masters			Ph.D.		
HEGIS		M	W	T	M	W	T	M	W	T
0100	Agriculture	C 836	C 837	*C 838*	C 839	C 840	*C 841*	C 842	C 843	*C 844*
0200	Architecture	C 851	C 852	*C 853*	C 854	C 855	*C 856*	C 857	C 858	*C 859*
0300	Area Studies	C 866	C 867	*C 868*	C 869	C 870	*C 871*	C 872	C 873	*C 874*
0400	Biology	C 881	C 882	*C 883*	C 884	C 885	*C 886*	C 887	C 888	*C 889*
0500	Business	C 896	C 897	*C 898*	C 899	C 900	*C 901*	C 902	C 903	*C 904*
0600	Communications	C 911	C 912	*C 913*	C 914	C 915	*C 916*	C 917	C 918	*C 919*
0700	Computer Sci.	C 926	C 927	*C 928*	C 929	C 930	*C 931*	C 932	C 933	*C 934*
0800	Education	C 941	C 942	*C 943*	C 944	C 945	*C 946*	C 947	C 948	*C 949*
0900	Engineering	C 956	C 957	*C 958*	C 959	C 960	*C 961*	C 962	C 963	*C 964*
1000	Art	C 971	C 972	*C 973*	C 974	C 975	*C 976*	C 977	C 978	*C 979*
1100	Foreign Lang.	C 986	C 987	*C 988*	C 989	C 990	*C 991*	C 992	C 993	*C 994*
1200	Health	C1001	C1002	*C1003*	C1004	C1005	*C1006*	C1007	C1008	*C1009*
1300	Home Econ.	C1016	C1017	*C1018*	C1019	C1020	*C1021*	C1022	C1023	*C1024*
1400	Law	C1031	C1032	*C1033*	C1034	C1035	*C1036*	C1037	C1038	*C1039*
1500	Letters	C1046	C1047	*C1048*	C1049	C1050	*C1051*	C1052	C1053	*C1054*
1600	Library	C1061	C1062	*C1063*	C1064	C1065	*C1066*	C1067	C1068	*C1069*
1700	Math	C1076	C1077	*C1078*	C1079	C1080	*C1081*	C1082	C1083	*C1084*
1800	Military	C1091	C1092	*C1093*	C1094	C1095	*C1096*	C1097	C1098	*C1099*
1900	Physics	C1106	C1107	*C1108*	C1109	C1110	*C1111*	C1112	C1113	*C1114*
2000	Psychology	C1121	C1122	*C1123*	C1124	C1125	*C1126*	C1127	C1128	*C1129*
2100	Public Affairs	C1136	C1137	*C1138*	C1139	C1140	*C1141*	C1142	C1143	*C1144*
2200	Social Sciences	C1151	C1152	*C1153*	C1154	C1155	*C1156*	C1157	C1158	*C1159*
2300	Theology	C1166	C1167	*C1168*	C1169	C1170	*C1171*	C1172	C1173	*C1174*
4900	Interdisciplinary	C1181	C1182	*C1183*	C1184	C1185	*C1186*	C1187	C1188	*C1189*
	TOTAL	C1196	C1197	*C1198*	C1199	C1200	*C1201*	C1202	C1203	*C1204*

Part C: Two-Year Degrees

	(56) Not Occup.	(51, 52, 53, 54) Science/ Tech.	(50+55) Non-Sci. NonTech.	Total	Below Tech./ Semi-Prof.	** Total
More than 2, Less than 4						
Creditable to BA						
A.A						
M	C1211	C1231	C1251	C1271	C1291	C1311
W	C1212	C1232	C1252	C1272	C1292	C1312
T	*C1213*	*C1233*	*C1253	*C1273*	*C1293*	*C1313*
Other						
M	C1214	C1234	C1254	C1274	C1294	C1314
W	C1215	C1235	C1255	C1275	C1295	C1315
T	*C1216*	*C1236*	*C1256*	*C1276*	*C1296*	*C1316*
Not Creditable						
A.A						
M	C1217	C1237	C1257	C1277	C1297	C1317
W	C1218	C1238	C1258	C1278	C1298	C1318
T	*C1219*	*C1239*	*C1259*	*C1279*	*C1299*	*C1319*
Other						
M	C1220	C1240	C1260	C1280	C1300	C1320
W	C1221	C1241	C1261	C1281	C1301	C1321
T	*C1222*	*C1242*	*C1262*	*C1282*	*C1302*	*C1322*
More than 1, Less than 2						
M	C1223	C1243	C1263	C1283	C1303	C1323
W	C1224	C1244	C1264	C1284	C1304	C1324
T	*C1225*	*C1245*	*C1265*	*C1285*	*C1305*	*C1325*

EDSTAT

INFORMATION BRIEF S1

JULY, 1976

ABSTRACT

EDSTAT II is a national on-line education data retrieval system operated by the National Center for Education Statistics. Users anywhere in the continental United States can interrogate the extensive data bank of education statistics through standard keyboard-type computer terminals using the INFONET time-sharing system. This resource represents a flexible complement to NCHEMS in-house data resources.

GENERAL DESCRIPTION

EDSTAT II is currently available for use on the INFONET computer network of Computer Sciences Corporation, sponsored by the General Services Administration. EDSTAT data files have been prepared for use with SYSTEM 2000, an information management and retrieval software package, permitting many users to simultaneously interrogate the same data base. In addition, EDSTAT data files are available in FORTRAN-compatible form to permit users to develop educational models or perform statistical analyses using existing software packages (e.g., SPSS - Statistical Package for the Social Sciences).

DOCUMENTATION AND PUBLICATIONS

- EDSTAT II System Documentation. Unpublished xerox copies.
- CSTS General Programming Subsystem (GPS) Command and Directive Summary. Publication E00170-1 (Rev 5), Computer Sciences Corporation, 1973.
- SYSTEM 2000 Reference Manual. Publication E00209-1, Computer Sciences Corporation, 1973.
- Guide to General Programming Subsystem (GPS). Publication E00138-01 (Rev 1), Computer Sciences Corporation, 1973.

EDSTAT data are stored both on-line and on magnetic tape. Frequently used data are immediately available to users. Other data require delays of a few minutes to a few hours (depending upon the size of the data file) before they can be interactively acquired by the user. Costs of using EDSTAT vary according to requirements and usage. For example, a simple tabulation from an average size data file may cost less than $5.00 to prepare. Other types of reports may cost in excess of $100. The user bears all telephone and data processing charges for his use. All EDSTAT data base preparation and storage costs are incurred by NCES.

Access to the System. Because INFONET is a national time-sharing system, EDSTAT can be accessed by calling the number of the nearest INFONET message concentrator location. The actual INFONET computer system itself is distributed throughout the United States. The computer processing of all EDSTAT data requests is in Chicago, Illinois.

NCHEMS users will normally access the system by calling INFONET's Denver office (information - 893-5020, Computer - 893-3808). Thus, there are no long-distance telephone charges for staff in Boulder.

For purposes of EDSTAT demonstration and special analysis tasks, NCHEMS staff may require system use outside of Boulder. The following computer access numbers are valid as of April, 1976.

• Washington, D. C.	(Silver Springs, MD) (301)565-3250
• Los Angeles	(213)772-6971
• San Francisco	(415)391-9080
• Chicago	(312)325-7212

Atlanta	(404)325-3250
Miami	(305)442-4980
Dallas	(214)638-7850
New York	(212)551-9285
Milwaukee	(414)289-9010
St. Louis	(816)756-0172

EDSTAT Data Bases. The scope of EDSTAT data holdings is essentially limited to United States government statistics, primarily those collected by NCES. To date, EDSTAT has placed most emphasis on developing postsecondary education data resources (e.g., HEGIS) for public access, but there are increasing numbers of requests for other types of education data - vocational, elementary/secondary, etc. - and EDSTAT is actively seeking to address these data needs.

The list of current EDSTAT data bases appears in Figure 1. It should be noted that this list of data bases is revised frequently, and the user is encouraged to obtain the most current list available if there are questions as to data base availability (see section on System Support Programs). The entries in Figure 1 are file (or data base) names in the INFONET system and can only be accessed through the SYSTEM 2000 information retrieval system. The means of accessing particular data bases will be described below.

Detailed documentation on most of the data bases cited in Figure 1 can be obtained in NCHEMS Technical Documentation Library (look for EDSTAT II system documentation, or alternatively, look for complete documentation on individual data bases - e.g., HEGIS - Earned Degrees Conferred). Data elements for all NCHEMS in-house data bases have been "named" to correspond exactly to the names used for EDSTAT documentation. The user is cautioned to check carefully for documentation for the year of data required for investigation, since

FIGURE I - Current EDSTAT Data Bases (June, 1976)

Entry		1970-71	1971-72	1972-73	1973-74	1974-75	1975-76
5905	HEGIS - Characteristics of Institutions of Higher Education	INS71	INS72	INS73	INS74	INS75*	INS76*
5904	HEGIS - Opening Fall Enrollment and Basic Student Charges	OFE71	OFE72	OFE73	OFE74	OFE75*	
5906	HEGIS - Financial Statistics in Higher Education	FIN71	FIN72	FIN73	FIN74*		
5908	HEGIS - Degrees and Other Formal Awards Conferred (Summary)	ERD71	ERD72	ERD73	ERD74*		
5901	Postsecondary Vocational Education Directory	PSVD71		PSVD73			
--	CENSUS/ELSEGIS - Sample Staff, Finance and Socio-Economic Data	CEL71					
5911	HEGIS - Residence and Migration			RES73			
5902	CPS - Postsecondary School Enrollment				CPS74		
5910	HEGIS - Inventory of College and University Physical Facilities		FAC72				
5909	HEGIS - Salaries and Tenure of Full-Time Instructional Faculty					EMP75*	EMP76*
--	HEGIS - Merged (Institutional Characteristics and Opening Fall Enrollment and Financial Statistics + Earned Degrees)					HEGS74	HEGS75*
5907	HEGIS - Enrollment for Advanced Degrees			ADV73	ADV74	ADV75	
--	Office of Civil Rights - Elementary/Secondary School Rights Survey	ESCR71	ESCR72	ESCR73			
5912	HEGIS - College and University Libraries					LIB74	
6602	PSE Fiscal Operations (Student Aid Program)	FISC71	FISC72	FISC73			

Notes: (1) Entries in this table are GPSS file names.
(2) Asterisked entries are maintained on-line. Other files can be loaded from tape.
(3) File names cited can be used only with SYSTEM 2000. FORTRAN-readable files have .FT appended to file name (e.g., INS75.FT). All FORTRAN files must be loaded from tape.

the data base format and data element names occasionally vary for different years of the same data base.

EDSTAT Development Schedule. EDSTAT data holdings are continually being modified, and new data bases are constantly being added to the EDSTAT library. The following data bases are in various stages of development prior to their release for use by the EDSTAT user community.

EDSTAT Current Development Schedule

(June, 1976)

	Years	Available
• Vocational Education - Financial Status, Employees, Placement Completions, and Enrollments	1971-75	7/76
• United States Office of Civil Rights - Postsecondary	1970 1972 1974	7/76
• ELSEGIS - Directory	NA	7/76
• Elementary/Secondary Staff and Finances	1971 +	7/76
• National Assessment of Educational Progress	1970-71	7/76
• Secondary School Offerings and Enrollments		7/76

USING SYSTEM 2000. Because SYSTEM 2000 is an elaborate information retrieval system with many command formats, it is perhaps easier to illustrate the system through several examples. The user is directed to the SYSTEM 2000 reference manual for an in-depth discussion and explanation of all possible commands.

The first example illustrates retrieval of student tuition and fee revenues for academic year 1973-74 for the University of Colorado main campus.

FIGURE 2: SAMPLE-EDSTAT DATA RETRIEVAL

(Turn on terminal, make sure ONLINE button is depressed, dial 893-3808, wait for carrier signal, then place receiver into acoustic coupler.)

```
E
PORT:  67
CENTER:  LL         Computer Center Requested
TERMINAL LL2001-LL32-18-067 04/24/76 11:55:07
LOGON:  GPS BIP002,BIP002,SWA               Accounting Information.  Please use the
:SYS2K             Call for SYSTEM 2000        account number assigned to you.
 04/24/76  11:55:31  BEGIN SYSTEM 2000  RELEASE 2.60
---
USER,NCES:             Bookkeeping
---
SHARED DBN IS FIN74:           Ask for FIN74 data base.
 ASSIGNED. . .FIN74            1          1          03/22/76     18:51:52
---
PRINT C602 WHERE FICE EQ 1370:             Request tuition and fee revenues for
 602*   19261203                             University of Colorado.
---
EXIT:                 Get out of SYSTEM 2000.
 11:56:54  END SYSTEM 2000
 STOP 0
SRU/S:6.4
:OFF                  LOG OFF the INFONET system.
USAGE ON 04/24/76 AT 11:57:00
SRU/S:6.8       ELAPSED TIME:  00:01:39            (User input is underlined.)
GOOD BYE.
```

Clearly, in the above example the user needed to know the appropriate data base to use (see Figure 1), the appropriate data element name (see Data Base Directory for FIN74 in EDSTAT System Documentation), and the appropriate FICE code for the University of Colorado (see either EDSTAT System Documentation or an Education Directory).

A second example contrasts the use of the PRINT command and the LIST command in a slightly more complicated data request (list the names and Carnegie codes for public two-year institutions in Colorado). The teletype output from this example appears in Figure 2.

FIGURE 3: EXAMPLE-EDSTAT DATA RETRIEVAL

```
E
PORT:  67
CENTER: LL
TERMINAL  LL2004-LL32-18-067  04/24/76  12:13:46
LOGON:  GPS  BIP002,BIP002,SWA
:SYS2K
 04/24/76   12:14:07   BEGIN SYSTEM 2000   RELEASE 2.60
---
USER,NCES:
---
SHARED DBN IS INS75:
 -502- DATA BASE DOES NOT EXIST -
---
SHARED DBN IS OFE75:
 -502- DATA BASE DOES NOT EXIST -
---
SHARED DBN IS OFE76:
  ASSIGNED. . .OFE76              2          1       04/09/76      08:40:20
---
PRINT INSTNAME,CARNCODE WHERE STATE EQ 15 AND CONTROL EQ 1 AND
---
TYPE EQ 3:
  11* ARAPAHOE CMTY COLLEGE
  10* 4.1
  11* LAMAR COMMUNITY COLLEGE
  10* 4.1
  11* COLORADO NORTHWESTERN CC
  10* 4.1
  11* NORTHEASTERN JR COLLEGE
  10* 4.1
  11* OTERO JUNIOR COLLEGE
  10* 4.1
  11* TRINIDAD STATE JR COLLEGE
  10* 4.1
  11* COLO MTN COLLEGE WEST DAM
  10* 4.1
  11* AIMS COMMUNITY COLLEGE
  10* 4.1
  11* DENVER NORTH CAMPUS, CC OF
  10* 4.1
  11* EL PASO COMMUNITY COLLEGE
```

These data bases exist, but are not currently on-line.

Two data items are to be printed after a more complicated selection process. Note that continuation line is used.

Data items are printed one per line.

```
  10* 4.1
  11* COLO MTN COLLEGE EAST DAM
  10* 4.1
  11* DENVER AURARIA DAM,CC OF
  10* 4.1
  11* DENVER RED ROCKS CAM,CC
  10* 4.1
  11* MORGAN COMMUNITY COLLEGE
  10*  .0
---
LIST/TITLE L (25),R(5)/INSTNAME,CARNCODE WHERE
---
STATE EQ 15 AND CONTROL EQ 1 and TYPE EQ 3:
```

The list command causes data elements to be printed several per line. Here L(25) means INSTNAME should be left-adjusted in a 25-character field. R(5) means CARNCODE should be right-adjusted in a 5-character field.

```
***
*  ARAPAHOE CMTY COLLEGE           4.1
*  LAMAR COMMUNITY COLLEGE         4.1
*  COLORADO NORTHWESTERN CO        4.1
*  NORTHEASTERN JR COLLEGE         4.1
*  OTERO JUNIOR COLLEGE            4.1
*  TRINIDAD STATE JR COLLEGE       4.1
*  COLO MTN COLLEGE WEST DAM       4.1
*  AIMS COMMUNITY COLLEGE          4.1
*  DENVER NORTH CAMPUS,CC OF       4.1
*  EL PASO COMMUNITY COLLEGE       4.1
*  COLO MTN COLLEGE EAST DAM       4.1
*  DENVER AURARIA DAM CC OF        4.1
*  DENVER RED ROCKS DAM,CC         4.1
*  MORGAN COMMUNITY COLLEGE         .0

---
EXIT:
  12:21:09  END SYSTEM 2000
  STOP 0
SRU/S:13.2
:OFF
USAGE ON 04/24/76 AT 12:21:13
SRU/S:13.7      ELAPSED TIME:  00:07:14
GOOD BYE.
```

No data was entered here.

Accessing Off-Line Data Bases. Because of the large number of data bases in the EDSTAT library only a small fraction can be maintained on-line for immediate access. The data bases maintained on-line are generally those which are accessed most frequently. The remainder of the EDSTAT data bases reside on magnetic tape and can be made available for on-line access using the procedure illustrated in Figure 4. Restoring tape data bases for on-line use generally takes from five minutes to two hours depending on data base size and computer system workload. An average wait is approximately fifteen minutes.

FIGURE 4: EXAMPLE-PROCEDURE FOR LOADING AN OFF-LINE DATA BASE

```
E
PORT:  64
CENTER:  LL
TERMINAL LL2004-LL32-18-064 04/24/76  11:23:42
LOGON:  GPS UET099,EDSTAT                      Note-different account and password
BUD000  W ACCOUNT CONTRACT LIMIT EXCEEDED.
ALL USERS PLEASE EXECUTE PROGRAM STATUS WITH THE NEWS OPTION
                                 ------         -

EDSTAT DATA BASE ACTIVATION SYSTEM
LOGIN:  KENT,FIN72                             Enter first name, then data base
                                                 name.
TAPE TO ACTIVATE DATA BASE HAS BEEN REQUESTED
PLEASE DO NO DISCONNECT TERMINAL UNTIL DATA BASE IS READY     Please observe!

GPS354 I DEVICES ALLOCATED
BEGIN ACTIVATING REQUESTED DATA BASE
PLEASE REMAIN CONNECTED
REQUESTED DATA BASE IS READY
USAGE ON 04/24/76 AT 11:28:51
SRU/S:49.7      ELAPSED TIME:  00:04:54        Account UET099 was automatically
                                                 logged-off, and a new log-on was
                                                 requested.
TERMINAL LL2004-LL-32-18-064 04/24/76 11:28:52
LOGON:  GPS BIP002,BIP002,SWA                  Please supply your own project
:SYS2K                                           identification.
 04/24/76  11:29:24  BEGIN SYSTEM 2000  RELEASE 2.60
---
USER,NCES:
---
SHARED DBN IS FIN72:
 ASSIGNED...FIN72    3   204  07/21/75     15:24:58      Note that FIN72 is now
---                                                        ready for access.
DESCRIBE C701:
    701*  X ED LIB  (NON-KEY   INTEGER NUMBER 9(10))
---
EXIT:
 11:30:39  END SYSTEM 2000
 STOP 0
SRU/S:7.6
:OFF                                           (User entries are underlined.)
USAGE ON 04/24/76 AT 11:30:44
SRU/S:8.1       ELAPSED TIME:  00:01:29
GOOD BYE.
```

Known System Difficulties. Several problem areas in using the INFONET System have become obvious from repeated use and should be identified here.

- There is no effective way of extracting information from two or more data bases simultaneously using SYSTEM 2000. However, the FORTRAN-readable data bases can be accessed by user-written programs if the application is sufficiently important to devote staff resources in programming.

- The user is advised to exercise caution in using the SYSTEM 2000 Report Writer Feature. While this system feature is reasonably dependable in terms of accuracy, it is also extremely expensive (some reports cost in excess of $100) for use in generating statistics summaries.

- Occasionally, SYSTEM 2000 will issue a message stating that the data base in use has been damaged and that a data base administrator should be called. In this event, NCES should be informed immediately (see Additional Contacts section). It is important to describe the user input command which caused the message to be issued.

- Many of the data elements used in the EDSTAT system are declared as "functions" of other data elements. Each time a function element is accessed (asterisks are used around the "C number"), SYSTEM 2000 recomputes the data value to be printed. For all function elements, as well as all user specified arithmetic computations, there is a danger that the computation will be performed incorrectly if any of the data values were blank (zero). NCES is aware of this problem and has corrected it for most data bases after 1972-73. There are, however, some data bases which remain uncorrected, and users should test the validity of computations on sample data before doing volume data processing.

Additional Contacts. NCHEMS staff are urged to attempt to resolve errors by themselves or in consultation with other staff. If, however, there are problems relating either to the operation of the INFONET system (including SYSTEM 2000) or to the EDSTAT data bases, the following contacts may be helpful:

- INFONET (Denver Office)
    - Kitty Pilgrim (303) 893-5020
    - Curt Fowler

- EDSTAT (NCES: Statistical Systems Branch)
    - Rick Heilbron (202) 245-8760
    - Bob Yuill
    - Bill Dorfman

NATIONAL CENTER FOR HIGHER EDUCATION MANAGEMENT SYSTEMS AT WICHE

INFORMATION AND ANALYTIC
RESOURCE GUIDE

NATIONAL EDUCATION DATA LIBRARY
(NEDL)

INFORMATION BRIEF S2 MAY, 1976

ABSTRACT

The National Education Data Library (NEDL) offers a variety of services to users of education data who require magnetic data tapes or access to on-line data banks. On-line data access is effected through long-distance terminal access to the University of Illinois Consolidated Administrative Computer Center in Chicago using the DLA data management system. NEDL coordinates its user training function and special user services through its field office in Washington, D. C.

GENERAL INFORMATION

The underlying purpose for NEDL consists of facilitating through a nationwide communications system of (1) data access networks, (2) user training programs, and (3) the compilation and exchange of data usable by education decision makers. More specifically, NEDL is involved in the following:

- serving as a clearing agency on the availability of education data bases through its Catalogue of Selected Machine-Readable Data Bases for Postsecondary Education

DOCUMENTATION AND PUBLICATIONS

- NEDL System Documentation. Unpublished xerox data base directories.
- Data Library Access System Documentation. Release 1.1, Systems Research, Inc., Los Angeles, California, 1975
- University of Illinois Consolidated Administrative Computer Center User's Manual

- providing an on-line library of data bases which can be accessed directly or reproduced for users
- providing an elaborate information access network to facilitate user of its library
- updating, maintaining, and reformatting data files in a systematized manner
- soliciting the contribution of special purpose data bases of potential general interest from its user constituency

NEDL personnel, working with many state and institutional representatives, have identified a broad range of data resources for inclusion in the NEDL library. A few of these data files have been prepared for use in an on-line, interactive environment.

NEDL On-Line Data Bases. Currently, there are only two data bases defined for use with DLA. These appear below:

NEDL On-Line Data Bases
(April, 1976)

- HEENFI74 - HEGIS Enrollment Financial Characteristics for academic year 1973-74. This file is closely comparable to a combination of the EDSTAT OFE 74 and FIN 74 files.
- FINAID74 - This is a reformatted version of the 1973-74 academic year fiscal operations tapes as maintained by USOE-Bureau of Postsecondary Education. Fiscal operations tapes contain information on the NDSL, CWS, and SEOG student aid program.

Documentation (including a detailed listing of data elements) on all data bases currently active on NEDL's on-line system can be found in NEDL System Documentation.

The University of Illinois System. Illinois' Consolidated Administrative Computer Center (CACC) provides all NEDL computer services, both for data distribution and for on-line access to selected data files. The center itself is located at the Chicago Circle Campus of the University of Illinois, and it is connected to other principal campuses through high-speed micro-wave data channels. The computer hardware is an IBM 370/168 with four Megabytes core and a wide range of peripheral devices. CACC uses the OS/VS operating system and supports the use of TSO, CICS, Model 204, WYLBUR, and IMS.

All on-line operations involving NEDL data bases require the use of low-speed teletype-compatible terminal devices. Although NEDL is currently involved in creating its own national data transmission network to simplify access to CACC facilities, it is currently necessary to gain computer access through a long-distance direct dial telephone call. The following telephone numbers are currently in use:

312-996-8804
312-996-8808
312-996-8821
312-996-8819
312-996-8814

Although the computer system can determine terminal transmission speed and parity, the user must ensure that upper-case alphanumeric characters are used.

Data Library Access (DLA) System. DLA, like most information retrieval and data management systems, has a vast array of options and special commands which allow the user to select appropriate data items and display them in an acceptable format. The user is directed to Data Library Access System Documentation for a thorough treatment of all options and commands. This section, however, will describe those commands which are essential to the information retrieval process.

In order to understand the uses of DLA, it is helpful to understand the general operation of the program. This can best be explained with an example. Suppose that one wanted to know the total enrollment of Illinois major research colleges and universities. The query would be like:

```
PRINT FICE INSTNAME EN3TOT WHERE STATE = 23 AND CARNCODE = 11
```

This represents, "Print a report listing the institutional number, institutional name, and total enrollment for 1973 for all Illinois (state code is equal to 23) major research universities (Carnegie classification of the institution is 1.1)." The resulting report, from a data file prepared from the annual 1972-73 Higher Education General Information Survey of the National Center for Educational Statistics, would be like that shown below.

```
PRINT FICE INSTNAME EN3TOT WHERE STATE = 23 AND CARNCODE = 11 $$
     43 COLUMNS NEEDED        (F/S/T/#)?

F
  INST              INSTITUTION              ENROLLMENT
  FICE                 NAME                  TOTAL 1973
```

```
1739  NORTHWESTERN UNIVERSITY                         14,418

1774  UNIVERSITY OF CHICAGO                            9,136

1775  U OF ILL URBANA CAMPUS                          35,307

                                                      58,861

  60 RECORDS READ

   3 RECORDS QUALIFY
```

In this example, DLA responded to the inquiry by printing:

```
43 COLUMNS NEEDED (F/S/T/#)?
```

This response indicated that the query was correctly formulated, that is, there was a data element for each data element to be reported and for each data element used for the selection. The response indicated that the report would be 43 columns wide and asked if a full file search should be executed (F), a full file search with elementary statistics for each numeric data element should be produced (S), or whether this was a test and to print only a sample (T), or whether printing should continue until some specific number of responses was achieved. (User would respond with an integer number.) After responding F for the full file, DLA searched the entire file checking the record of each college and university, rejecting any records for institutions in any state other than Illinois (state code of 23) and Carnegie classifications other than major research universities (Carnegie classification 1.1).

The names of the data elements are typically contained in a data base directory (again, see <u>NEDL System Documentation</u>), a document accompanying a data tape which gives the source, coding and component name for each data element. The meanings of these data and the data element names are usually familiar to analysts working with the data, and after some experience at agencies which daily used on-line data retrieval systems, by all staff members.

A second example provides a larger picture of the use of DLA, including the various log-on procedures required to use the system, the commands necessary to access a particular data base, and examples of more complicated DLA commands. The example computer run appears in Figure 1.

Figure 2 contains a brief summary of the essential DLA system commands (a complete list of all commands appears in Appendix A of DLA System Documentation.)

User Contacts. All problems with the computer system, or the NEDL on-line data bases, or the DLA program should be communicated directly to John Roberts in NEDL's Washington field office (phone 202-785-0920). He will forward all difficulties related to the University of Illinois' system back to the appropriate staff in Chicago.

FIGURE I:

SAMPLE COMPUTER RUN

(User Input is Underlined)

```
Turn on teletype, 30 cps, odd partiy, ON-LINE button down, UPPER CASE button
down, then dial number.
PTLOGON ←——— Type within 18 seconds after hearing carrier signal.

 ENTER T FOR TSO, M FOR M204, OR C FOR CICS
               ↑
                ╰—— Ignore this directive and type PTLOGON again
PTLOGON
CACC-TSO
ACCT?BFD0000NCHEMSXXX
PASSWORD?
         MXXXWWMMXWMMMXWXZZZZZZZZ    (CR) ←———— CR means type a carriage
CBI?     (CR)                                   return only.
PROC?    (CR)
MSGS?    (CR)
 042  -  0011  -  0091303
       329 ACCT UNITS  NEDL DEMONSTRATIONS
DISK TRACKS 1368 OF 4000 MAX
BFD0000 LOGON IN PROGRESS AT 11:49:33 ON MAY 26, 1976
NO BROADCAST MESSAGES
READY
EX DLA ←——— Causes the DLA program to begin execution
 **************
*
*
*      *
 ********
DATA LIBRARY ACCESS                                RELEASE 1.1
DLA IS A PROPRIETARY PROGRAM PRODUCT OF SIGMA SOFTWARE COMPANY


ENTER FILE NAME
HEENFI74
ENTER READ PASSWORD
     (CR)
ENTER ROOT COMMAND
TERM M H REPORT ←— Specifies the teletype as a medium hard-copy device and that
NEXT:                                 reports will be requested next.
PRINT INSTNAME R4EGTOT E4EGTOT WHERE STATE EQ CO AND $$ ←— Request to print institu-
$$                                       tion name and FY 74 current fund educational
TYPE EQ 3                                and general revenues and expenditures.  $$
       57 COLUMNS NEEDED        (F/S/T/*)?    means that request is continued on
F ←——— Perform a full file search.            next line.

DLA050                  DATA LIBRARY ACCESS              PAGE         1
HEENFI74                                                 PROCESSED 05/26/76
```

```
                               FISCAL-74         FISCAL-74
  INSTITUTION                ED & GEN REV      ED&GEN EXP
      NAME                       TOTAL             TOTAL

ARAPAHOE CMTY COLLEGE         $2,436,664        $2,414,623
LAMAR COMMUNITY COLLEGE         $862,940          $830,993
MESA COLLEGE                  $3,399,791        $3,795,645
RANGELY COLLEGE                 $857,521          $686,029
NORTHEASTERN JR COLLEGE       $2,022,630        $2,101,704
OTERO JUNIOR COLLEGE          $1,534,724        $1,482,189
TRINIDAD STATE JR COLLEGE     $1,915,677        $1,915,677
COLO MTN COLLEGE WEST CAM     $1,600,034        $1,758,885
COLO MTN COLLEGE DEN OFF                 no data
AIMS COLLEGE                  $2,670,215        $2,749,499
DENVER NORTH CAMPUS,CC OF     $4,783,318        $4,239,762
EL PASO COMMUNITY COLLEGE     $5,705,885        $4,827,280
COLO MTN COLLEGE EAST CAM     $1,187,481        $1,305,376
DENVER AURARIA CAM,CC OF      $3,032,049        $2,687,498
      CR
DENVER CENTRAL OFF,CC OF                 no data
MORGAN CO CMTY COLLEGE                   no data

                             $37,262,739       $35,451,949

     3,216 RECORDS READ
        17 RECORDS QUALIFY
```

The terminal pauses approximately every 22 lines. Type a carriage return to continue.

```
NEXT:
SUMMARIZE R4EGTOT E4EGTOT WHERE STATE EQ CO AND TYPE EQ 3
```

Get a summary of the same data.

```
DLA050                 DATA LIBRARY ACCESS              PAGE      2
HEENFI74                                                PROCESSED 05/26/76

         FISCAL-74            FISCAL-74
        ED & GEN REV         ED&GEN EXP
           TOTAL                TOTAL

TOT       $37,262,739          $35,451,949
AVG        $2,661,624           $2,532,282
STD        $2,183,606           $2,322,991
MAX        $5,705,885           $4,827,280
MIN          $857,521             $686,029
CNT               $14                  $14
CZR                $0                   $0

  3,216 RECORDS READ
     17 RECORDS QUALIFY
```

```
NEXT:
LISTI                    Request the names of all files currently available under
FINAID74                   the NEDL System.
HEENFI74

NEXT:
FINISH                   Stop DLA.
** DLA050 PROCESSING COMPLETED **
READY
LOGOFF                   Sign off of the computer system.
CPU TIME(SECS)  14.3  C NNECT TIME(MINS)  11.6
INPUT REQUESTS  11  OUTPUT REQUESTS  77
DISK EXCPS 4144  ACCOUNTING UNITS   74
BFD0000 LOGGED OFF TSO AT 12:01:16 ON MAY 26, 1976
```

INFORMATION BRIEF S3 MAY, 1976

ABSTRACT

MARK IV is a language which provides simple access to file maintenance and to the functions related to the reporting of data. It is a privately developed and marketed package and is, therefore, available only at computer sites where it has been purchased.

NCHEMS users currently use the MARK IV at United Airlines although the University of Colorado, the Service Bureau Corporation, and Boeing Computer Services sites also have MARK IV.

GENERAL DESCRIPTION

MARK IV is a user-oriented language for maintaining and reporting data. Its chief advantage over programming languages such as COBOL and FORTRAN is that it takes the effort, time, and error-proneness out of producing reports and maintaining files.

DOCUMENTATION AND PUBLICATIONS

- MARK IV Reference Manual
- MARK IV Special Features
- MARK IV User's Guide
- MARK IV OS Operation's Guide
- MARK IV Pracniques Handbook

A copy of each of these publications is available in the RJE room or in the offices of Kent Weldon or Anahid Katchian.

Although MARK IV does not completely replace these languages, it does provide easier access to most of the functions and features most users need of a language in order to maintain and to report their data. Such features as updating files with transactions, preparing reports which contain data ranked, sorted, subtotaled, averaged, reports which are titled and displayed the way the user wishes, the ability to add, subtract, etc. variables and to do so selectively on chosen records. MARK IV does provide these common features, and in addition the user's request is not "cast in concrete" and unmodifiable as is often true in COBOL and FORTRAN programs.

What MARK IV cannot do is run a regression on data, plot data, calculate standard deviations--in short it is not suitable for statistical analyses--use SPSS or OSIRIS for such needs.

Access to MARK IV. MARK IV is currently available at two sites to NCHEMS users: United Airlines and the University of Colorado Administrative Computing Center. Although the latter site offers all the "bells and whistles" of MARK IV, the United site is most used by staff because of accessibility via the Remote Job Entry terminal (see Information Brief F1).

The vendors of MARK IV--Informatics, Inc.--provide instruction in its use in three-day and five-day classes. Alternately, staff development courses are periodically offered at NCHEMS which include discussion of most of the features of MARK IV.

The series of publications that are available to MARK IV are useful references if the user is already familiar with the concepts of MARK IV. However, for learning how to use MARK IV the best way is to attend a course either formally or informally and then to actually use it.

Contacts

At NCHEMS: Any of the following NCHEMS staff can be helpful with MARK IV questions:

DAVID MAKOWSKI
ANAHID KATCHIAN
KEN MALANOWICZ
WOODY LEONHARD
KENT WELDON
MARK SMITH

At Informatics: The vendors of MARK IV: Robert Lindsay, Marketing Representative, George White, Systems Engineer, Dallas, Texas - Telephone (214) 750-0800

Technical Comparison of United and University Sites

The versions of MARK IV vary slightly between United and the University sites and can be summarized as follows:

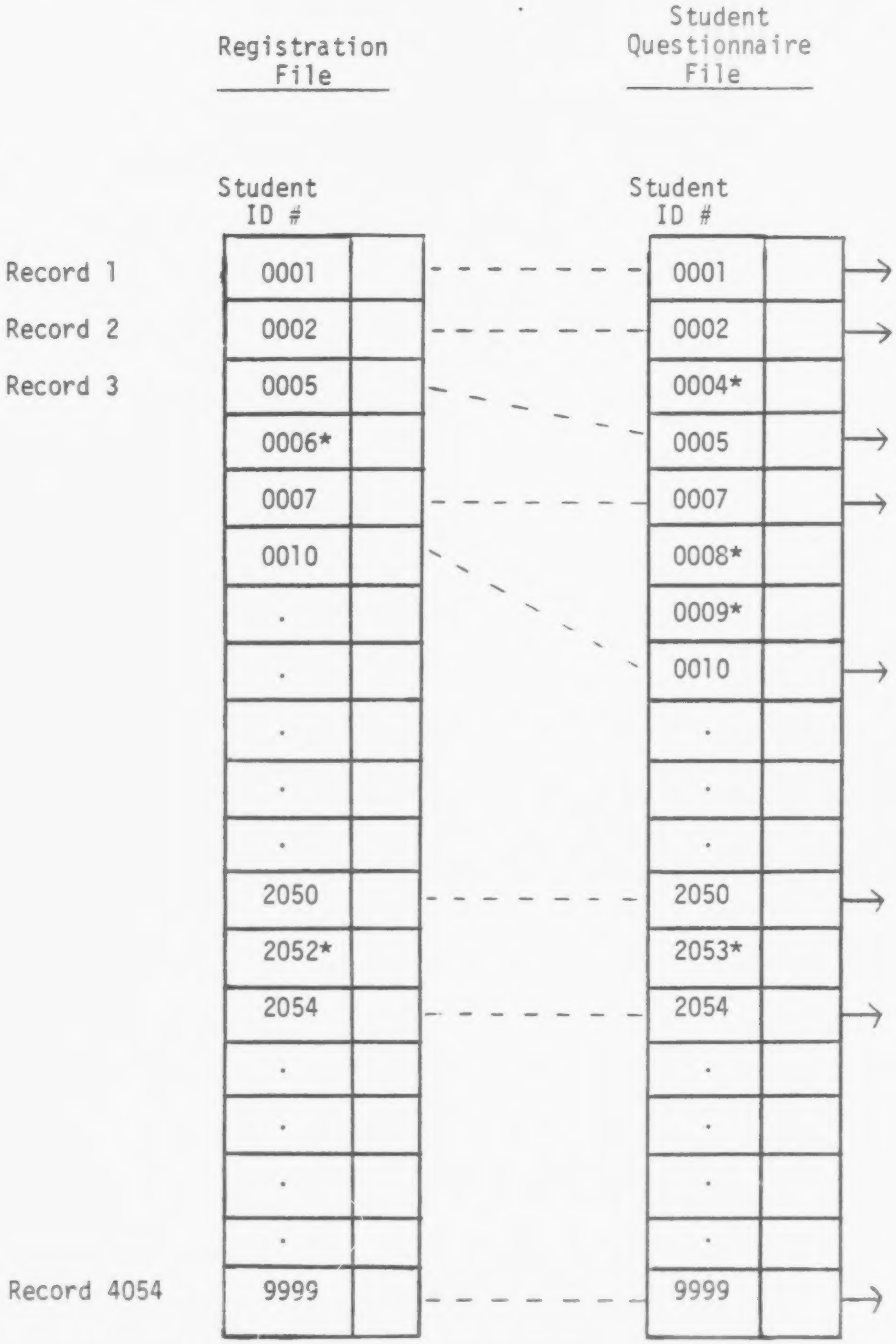
	United Airlines	University of Colorado
Hardware/Operating System	360/195 OS	370/145 OS/VSI
Model of MARK IV	234	270
Available via RJE	YES	NO
Special Features		
Table Lookup	X	X
Extended Transaction Processing		X
Extended Segment Processing	X	X
Extended File Processing	X	X
Indexed-Coordinated Files	X	X
Text Processing	X	X
Extended Reporting	X	X
Free Form	X	X
Catalog Maintenance		X
Number of files which can be processed simultaneously	4	10

Special Considerations and Comments

File Coordination. An often used feature of MARK IV is its ability to coordinate the simultaneous processing of several files. Two examples can illustrate how this file coordination operates.

I. Consider the many HEGIS files that are available for any one year. Suppose you would like a report which shows for each institution its regional accreditation (from Institutional Characteristics File), its fall enrollments (Opening Fall Enrollment File), and its instructional expenditures (Finances File) of each institution. Since three files are involved, they must be coordinated so that, for example, Yale's accreditation data is available when Yale's enrollment is and when its expenditure data is. Yale is identified on each file by its FICE code--the FICE code will be the key by which the files are synchronized or coordinated.

II. Consider the case of student data which are available on two reels of tape. One reel contains student registration data and the other contains the results of a student questionnaire. You would like a report which shows information on students from both files. If a student is identified by a unique number on both files, then this identifier can be the key upon which the files will be coordinated. MARK IV will line up the files so that records with the same value in the key field will be coordinated. The following is a more graphic representation of coordination.


Registration File
Student Questionnaire File
Student ID #
Student ID #
Record 1
Record 2
Record 3
Record 4054
0001
0002
0005
0006*
0007
0010
2050
2052*
2054
9999
0001
0002
0004*
0005
0007
0008*
0009*
0010
2050
2053*
2054
9999

*These records appear on only one file--the user has the option of ignoring them or processing them.

File Handling Limitations of MARK IV

1. Only files with logical records of 9999 characters or less are handled by MARK IV. Although most IBM operating systems allow for a logical record maximum of 32,767 characters, MARK IV's file definition allows only four positions to define the length and, therefore, the limit of 9999. The Parnes student data are examples of files whose records contain more than 9999 characters.

2. Files whose logical records span more than one physical record cannot be handled by MARK IV. To use such a file it must be converted, if possible, from its spanned form to a form where an entire logical record can be accessed in one physical record. The Census Summary Tapes are an example of files whose logical records span physical blocks.

Using MARK IV at NCHEMS

General. This section describes how to access the MARK IV system at United Airlines. The first part provides the necessary job control information for the general user to create a MARK IV file definition and to generate reports from a defined master file. The second part of this section provides detailed, technical descriptions of the MARK IV JCL procedures for users with more complex processing requirements.

Most users need be familiar with only two procedures:

- Procedure D which is used to define a file and to perform dictionary maintenance
- Procedure R which is used to produce reports

Probably the easiest way to describe how to use MARK IV is by example. The following examples illustrate a job to define a file (using Procedure D) and a job to process a MARK IV request to generate a report from the defined file (using Procedure R).

Defining a File to MARK IV. The following example illustrates a typical deck setup for defining a file in MARK IV. The first four cards are the job control cards necessary to execute the procedure, and the rest of the cards are the MARK IV input cards defining the file.

```
                   Your account number
//@DEFINE JOB (xxxxxxx),'name'
                              Your name
/*PASSWORD     NULLPASS
//DEF   EXEC   D
//D.M4INPUT   DD *
DEF     RC
PERSONELFD            F 270 10
PERSONELL0SOCSEC          1  12C1
PERSONELL1SOCSEC                      SOCIAL
PERSONELL2SOCSEC                      SECURITY            MARK IV FILE
PERSONELL3SOCSEC                      NUMBER
PERSONELL0NAME          13 45C                            DEFINITION CARDS
PERSONNEL1NAME                        NAME
PERSONELL0EMPLNUMB      76  6C
PERSONELL1EMPLNUMB                    EMPLOYEE NUMBER
          .
          .
          .
PERSONELL0WORKLOC      256 15C
PERSONELL1WORKLOC                     LOCATION
```

Generating Reports with MARK IV. After a file has been defined to MARK IV, the user can then generate reports from the defined file. The following example is a job that produces a report using the file definition (PERSONEL) of the master file defined in the previous example.

```
                   account number
//@GENREP   JOB   (xxxxxx),'name'
                               your name

/*PASSWORD        NULLPASS
/(SETUP           D00809,CR=100K
//REPT   EXEC    R,OLD=@1044.file name  <--  old master file
//R.M4INPUT  D *
REPT        RCPERSONELS   S
REPT        ERTODAY
REPOT       PR         GROUP   EQC1
REPT        E1
REPT        R1         NAME                  MARK IV REQUEST CARDS
REPT        R1         DEPT
REPT        R1         SALARY
REPT        R1         EXPER
```

The above example, accessing an old master file on a disk pack, would create a report of employee name, department, salary, and experience for those employees in group 1.

Technical Information. This section describes the JCL procedures used in processing MARK IV jobs at UAL. Included in the descriptions of the procedures are a listing of the procedure, a description of the symbolic parameters, the function of the procedure, any special requirements, and some examples of usage.

D Procedure. This procedure performs MARK IV dictionary maintenance including definition and deletion operations for files, transactions, and tables.

```
//D          PROC
//D          EXEC  PGM=MARKIV
//STEPLIB    DD    DSN=@1044.LOADMOD,DISP=(SHR,PASS)
//M4LIB      DD    DSN=@1044.M4LIB,DISP=(SHR,PASS)
//M4LIST     DD    SYSOUT=A
```

Usage. There are no symbolic parameters in the procedure, and execution is simply:

```
//DEF          EXEC    D
//D.M4INPUT          DD *

               .

               .

               .

   MARK IV Cards

               .

               .

               .
```

R Procedure. This procedure is used to process requests and generate reports in the MARK IV system. A listing of the procedure is shown below.

```
//R        PROC  OLD=NULLFILE,SPACE=4,SYSOUT=A,SUBF1=NULLFILE,
//           UNIT=3330,VOL=D00809,TRAN=NULLFILE,
//        RCORE='100K',R2CORE='100K',SUBTRK=100,
//           NEW=NULLFILE,NEWTRK=25,LRECL=,BLKSIZE=,
//            CORD1=NULLFILE.CORD2=NULLFILE.CORD3=NULLFILE
//R        EXEC  PGM=MARKIV,REGION=&RCORE
//STEPLIB   DD    DSN=@1044.LOADMOD.DISP=(SHR.PASS)
//M4LIB     DD    DSN=@1044.M4LIB,DISP=(SHR.PASS)
//M4LIST    DD    SYSOUT=A
//M4REPO    DD    DSN=&&REPO,UNIT=SYSDA,DISP=(NEW,PASS),
//            SPACE=(CYL,(2,1))
//M4SORT    DD    DSN=&&SORT,UNIT=SYSDA,DISP=(NEW.PASS),SPACE=(TRK,1)
//M4OLD     DD    DSN=&OLD.DISP=OLD,UNIT=&UNIT,VOL=SER=&VOL
//M4NEW DD DSN=&NEW,VOL=SER=&VOL,UNIT=&UNIT,
//           SPACE=(TRK,&NEWTRK,RLSE),
//   DISP=(NEW,KEEP)
//           DCB=(RECFM=FB.LRECL=&LRECL.BLKSIZE=&BLKSIZE)
//M4CORD1   DD    DSN=&CORD1,DISP=OLD,UNIT=&UNIT.VOL=SER=&VOL
//M4CORD2   DD    DSN=&CORD2,DISP=OLD,UNIT=&UNIT,VOL=SER=&VOL
//M4CORD3   DD    DSN=&CORD3,DISP=OLD,UNIT=&UNIT,VOL=SER=&VOL
//M4SUBF1   DD    DSN=&SUBF1,DISP=(NEW,PASS),UNIT=SYSDA,
//           SPACE=(TRK,&SUBTRK,RLSE)
//M4REJCT DD SYSOUT=A
//M4TRAN    DD    DSN=&TRAN.DISP=(OLD.PASS),UNIT=SYSDA
//R2       EXEC PGM=IERRC000.COND=(0.NE,R),REGION=&R2CORE
//SYSOUT    DD    SYSOUT=A
//STEPLIB   DD    DSN=SYS1.LINKLIB.DISP=SHR
//SYSIN     DD    DSN=&&SORT,DISP=(OLD,DELETE),UNIT=SYSDA
//SORTLIB   DD    DSN=SYS1.SORTLIB.DISP=SHR
//SORTWK01  DD    UNIT=SYSDA,SPACE=(CYL,(&SPACE.1),.CONTIG)
//SORTWK02  DD    UNIT=SYSDA,SPACE=(CYL,(&SPACE,1),,CONTIG)
//SORTWK03  DD    UNIT=SYSDA.SPACE=(CYL,(&SPACE.1),.CONTIG)
//SORTIN    DD    DSN=&&REPO.DISP=(OLD.DELETE),UNIT=SYSDA
//SORTOUT   DD    DSN=&&REPI.DISP=(NEW,PASS).UNIT=SYSDA,
//            SPACE=(CYL,(2,1)),
//            DCB=(RECFM=VB,LRECL=1020,BLKSIZE=1024)
//R3       EXEC  PGM=MARKIV.COND=(0.NE,R)
//STEPLIB   DD    DSN=@1044.LOADMOD,DISP=(SHR,PASS)
//M4LIB     DD    DSN=@1044.M4LIB.DISP=(SHR,PASS)
//M4LIST    DD    SYSOUT=&SYSOUT
//M4REPI    DD    DSN=&&REPI,DISP=(OLD,DELETE),UNIT=SYSDA
//M4INPUT   DD    DSN=@1044.ICARD,DISP=OLD,UNIT=&UNIT.VOL=SER=&VOL
```

The following symbolic parameters are used in the procedure. The default values are given in parentheses.

OLD -- Data set name for old master file

SUBFI-- Data set name for subfile created

TRAN -- Data set name for transaction file

NEW -- Data set name for new master file created

CORD1-- Data set name for coordinated file 1

CORD2-- Data set name for coordinated file 2

CORD3-- Data set name for coordinated file 3

UNIT -- Device type for all data sets (UNIT=3330)

VOL -- Volume serial number for all data sets (VOL=D00809)

SUBTRK- Primary space allocation in tracks for subfile (SUBTRK=100)

NEWTRK- Primary space allocation in tracks for new master file (NEWTRK=25)

RCORE -- Memory allocation for job step R--step that processes the MARK IV request (RCORE=100K)

R2CORE-- Memory allocation for job step R2--step that sorts the report file generated from the R step (R2CORE=100K)

Special Notes.

- The STEPLIB in this procedure is in the UAL system library. However, some projects have been using their own library on their own pack.
- If a new master file is created, the procedure is set up to keep the file as a permanent data set.
- The procedure can process up to three coordinated files at a time.
- In creating a subfile, the procedure specifies a temporary data set kept on a system device. No DCB parameters are specified since they

are set on the MARK IV output specification input card.

- The transaction file is also a temporary data set assumed to be created in a previous job step of the same job.

- The region size specified for the processing step (Step R) is set at 100K bytes. This value is satisfactory for most jobs, however, this parameter may need to be increased for jobs with any of the following characteristics:

    1. Processing data sets with large block sizes (over 10000 bytes)
    2. Using large tables with MARK IV table lookup
    3. Extremely long processing requests and output requests

If, during a MARK IV run, a system error 606 occurs (MARK IV error CV00), the region size for the step should be increased.

- For the sort step R 2, all parameters except for the region size are set. If a very long report is generated, the user may need to increase the region size by setting the R2CORE parameter.

Usage Examples.

1. To produce a report from an old master file:

```
//STEPL  EXEC R,OLD='@1044.EDSTAT.ERD72'
```

2. To produce a report and create a temporary subfile to be used in a succeeding step:

```
//     EXEC R,OLD='@1044.EDSTAT.OFE73', SUBF1='&&SUBFILE'
```

(The data set name &&SUBFILE specifies a temporary data set named SUBFILE.)

3. To create a master file and a report from a temporary transaction file created in a previous job step:

   ```
   //   EXEC  R,NEW='@1044.DEGREES',TRAN='&&TRAN73'
   ```

4. To create a permanent subfile and a report from a master file and a coordinated file:

   ```
     //STEP4  EXEC R,OLD='@1044.EDSTAT.OFE73',
                    CORD1='@1044.EDSTAT.FIN73',
                    SUBF1='@1044.EDSTAT.COMB73',
                    RCORE=150K
   //R.M4SUBFL DD DISP=(NEW,KEEP),UNIT=3330,VOL=SER=D00809
   ```

In order to save a subfile as a permanent data set, the DISP and the UNIT parameter must be overidden as well as the VOL-SER specified. This is accomplished by including the DD statement named R.M4SUBF1.

X Procedure. This procedure is useful for performing various file maintenance operations but cannot be used to generate a report. Operations include creating a new master file and creating subfiles. All symbolic parameters are similar to the R Procedure and will not be discussed here. One difference between data set characteristics in this procedure and Procedure R is that the transaction data set is a previously kept permanent data set.

```
//X          PROC   OLD=NULLFILE.NEW=NULLFILE,TRAN=NULLFILE,
//                     CORD1=NULLFILE.CORD2=NULLFILE.CORD3=NULLFILE,
//                  SUBTRK=100,
//                  UNIT=3330,VOL=D00809,XCORE=100K.SUBF1=NULLFILE
//X          EXEC   PGM=MARKIV.REGION=&XCORE
//STEPLIB    DD     DSN=@1044.LOADMOD.DISP=(SHR,PASS)
//M4LIB      DD     DSN=@1044.M4LIB.DISP=(SHR.PASS)
//M4LIST     DD     SYSOUT=A
//M4OLD      DD     DSN=&OLD.DISP=OLD.UNIT=&UNIT,VOL=SER=&VOL
//M4NEW      DD     DSN=&NEW.DISP=(NEW,KEEP),UNIT=&UNIT,VOL=SER=&VOL
//M4TRAN     DD     DSN=&TRAN.DISP=OLD.UNIT=&UNIT.VOL=SER=&VOL
//M4REJCT    DD     SYSOUT=A
//M4CORD1    DD     DSN=&CORD1,DISP=OLD.UNIT=&UNIT.VOL=SER=&VOL
//M4CORD2    DD     DSN=&CORD2,DISP=OLD,UNIT=&UNIT.VOL=SER=&VOL
//M4CORD3    DD     DSN=&CORD3,DISP=OLD,UNIT=&UNIT.VOL=SER=&VOL
//M4SUBF1    DD     DSN=&SUBF1.DISP=(NEW,PASS),UNIT=SYSDA,
//                  SPACE=(TRK.&SUBTRK,RLSE)
//M4REJCT DD SYSOUT=A
```

NATIONAL CENTER FOR HIGHER EDUCATION MANAGEMENT SYSTEMS AT WICHE

INFORMATION AND ANALYTIC
RESOURCE GUIDE

TPL (TABLE PRODUCING LANGUAGE) SYSTEM

INFORMATION BRIEF S4 MAY, 1976

ABSTRACT

Table Producing Language (TPL) is a computer language system, developed by the Bureau of Labor Statistics, designed to select, restructure, cross-tabulate, and display data. A set of TPL statements, when translated by a special computer program, instructs the computer as to which data are to be selected and tabulated and how to format them. To produce a table through TPL, the user specifies the variables to be shown and gives instructions which specify the table stub and head. Features of the TPL system (1) permit placing variables side by side, (2) allow for levels of subdivisions (variables within variables), and (3) designate separate, two-dimensional grids or the repetition of the grid for additional variables.

The system also makes it possible to calculate averages, create new variables from existing variables, calculate additional data after compilation of the tables has been completed, deal with subsets of information in the data file, and define new variables by grouping, deleting, or reordering values of existing variables. There is no limitation on the number of variables nor on the number of tables produced in a single run. The user can arrange output in any sequence because the sequence of the input data does not impose a restriction.

DOCUMENTATION AND PUBLICATIONS

- U. S. Department of Labor, Bureau of Labor Statistics. Table Producing Language Version 3.5: User's Guide. July, 1975
- U. S. Department of Labor, Bureau of Labor Statistics. Table Producing Language Version 3.5: Operation's Guide. July, 1975
- Mendelssohn, Rudolph C. The Development and Uses of the Table Producing Language. Bureau of Labor Statistics. Report 435, 1975

INTRODUCTION

There are two components of TPL. First, a detailed description of the computer data file must be prepared by someone familiar with its physical characteristics and content, including all portions of a record which may control tabular output. The various types of data must be named and their lengths and acceptable values specified. These entries collectively are called a code book. Code book preparation is a one-time activity, after which many TPL users can reference the file it describes without having to concern themselves with the details of file organization. A TPL code book is similar to a file definition in the MARK IV system.

The second component is a Table Producing Language from which the system name (TPL) is derived. TPL statements cause actual tables to be generated and depend upon the existence of a previously prepared code book for execution. However, the user would only need to know data names defined in the code book that are required within TPL statements. It is likely that one person will be responsible for code book preparation, after which many diverse users may reference it for producing tables.

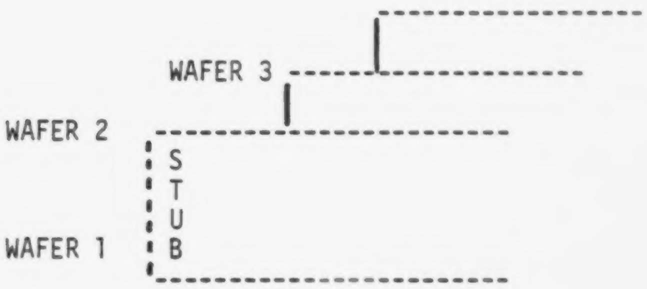
A TPL request, when translated by a special computer program, instructs the computer as to which data is to be tabulated and how it is to be formatted. Column and row titles are produced automatically and will consist of names defined in the code book or within the TPL request.

The Table Statement. At the heart of TPL is the TABLE statement which allows the user to define both the structure and the content of the desired output table. This one comprehensive statement specifies the types of tabulation to be performed and the arrangement of the tabulated data for output.

The general format of the TABLE statement is:

TABLE name: Ew, Es, Eh

where name identifies the table being specified and Ew, Es, and Eh are expressions which represent the three components of the table. An expression can be a variable name or a combination of variable names. The expression Eh is called the heading expression and defines the column structure of the table. The expression Es is called the stub expression and defines the row structure of the table. The two expressions Eh (heading) and Es (stub) define a two-dimensional array called the wafer definition. The expression Ew then defines repetitions of that wafer. A comma is required to separate each expression.



To illustrate the use of a TABLE statement, consider the following table which counts institutions according to type and control of the institution.

TABLE A1: TYPE, CONTROL

	CONTROL	
TYPE	PUBLIC	PRIVATE
2 YEAR	76	49
4 YEAR	203	158
UNIVERSITY . .	68	43

The table structure is defined by the TYPE codes (stub expression) and CONTROL codes (heading expression) to give a count of occurrences for all combinations of TYPE and CONTROL codes. In this case, the stub expression and heading expression produces six combinations of values. Each of these combinations defines a cell of the table. A cell can contain only one item of information. The table in this example consists of only one wafer, and each combination of TYPE and CONTROL code defines one and only one cell of the table.

Now adding a wafer expression to the TABLE statement gives:

TABLE A2: REGION, TYPE, CONTROL

where REGION is coded as:

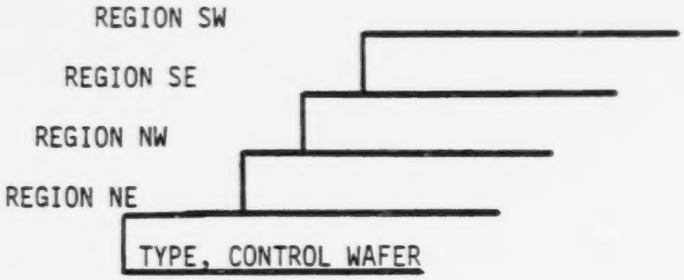
REGION = 1 for NE

REGION = 2 for NW

REGION = 3 for SE

REGION = 4 for SW

The addition of this expression will cause the TYPE, CONTROL wafer shown in TABLE A1 to be generated for each of the four REGION codes as shown below:



In the examples of TABLE A1 and A2, each expression in the TABLE statement consisted of only one variable name. However, many tabulation requests will require a more complex type of expression. To satisfy this need, two operators are provided: a nesting operator designated as BY and a concatenate operator designated as THEN. These operators can be used singly or in combination with any number of variables to create an expression of the TABLE statement.

Nesting Operator. The nesting operator provides the capability of pairing all possible combinations of codes for any given variables within one expression. For example, using the variables in TABLE A1, the statement TYPE BY CONTROL would produce the following header:

TYPE OF INSTITUTION					
2 YEAR		4 YEAR		UNIVERSITY	
CONTROL		CONTROL		CONTROL	
PUBLIC	PRIVATE	PUBLIC	PRIVATE	PUBLIC	PRIVATE
76	49	203	158	68	43

Each variable used in the nesting operator defines a level of nesting where there is no limit to the number of variables allowed within one expression. However, the use of the nesting operator with more than three variables normally makes the table difficult to understand.

Concatenate Operator. Placement of the concatenate operator between two variables causes the values of the two variables to be linked in a string. In other words, all values of the first variable are followed by all values of the second. For illustration, consider the table expression:

TABLE A3: TYPE THEN CONTROL:

where TYPE and CONTROL have the values used in previous examples.

TYPE OF INSTITUTION			CONTROL	
2 YEAR	4 YEAR	UNIVERSITY	PUBLIC	PRIVATE
125	361	111	347	250

In this case, the occurrence of a TYPE-CONTROL pair of values in an input record does not result in the tabulation of occurrences of the combination of values as in the nesting expression TYPE BY CONTROL. Instead, it results in the tabulation of individual occurrences of the two values.

It may be useful to think of the concatenate operator as defining an additional tabulation while the nesting operator defines an additional level of the same tabulation. When two variables are joined by the concatenate operator, each value of each variable defines a cell. Thus, the number of cells defined can be calculated by adding the number of values for each variable.

The nesting operator and the concatenate operator may be used in any combination within an expr ssion. It is suffice to note here that the nesting operator has precedence over the concatenate operator, although parentheses may be used to specify a different precedence. For further examples, refer to pages 7-12 of the TPL User's Guide.

Variable Types in TPL. The cells in the previous examples contained only simple frequency counts of the occurrences of the variable codes in a data file. The TPL TABLE statement allows aggregation of other values within the cells. When a variable is described in a code book (file definition), it can be assigned either a control or an observation attribute. This attribute defines the way in which a variable will be used. Control variables are used to control a tabulation and are the variables which have occurrences of the codes of the variables accumulated into the table cells. Observation variables are variables whose values are aggregated and placed in the cells. Examples of observation variables are: income, direct cost, expenditures, age, etc. Usually observation variables can be considered to have continuous values while control variables have discreet values or codes. Refer to pages 13-19 in the TPL User's Guide for a more detailed explanation of the differences between the two types of variables and for examples of their use in the TABLE statement.

The TOTAL Variable. Before leaving the description of the TABLE statement, one additional feature should be mentioned. To be able to express totals for all values in TPL tables, TPL provides special pseudo control variable TOTAL. Considering the previous example, TABLE A1, if totals for each of the control variables are desired, a TABLE statement to generate such a table would be:

TABLE A3: TOTAL THEN TYPE, TOTAL THEN CONTRL:

	TOTAL	CONTROL	
		PUBLIC	PRIVATE
TOTAL	597	347	250
TWO-YEAR . . .	125	76	49
FOUR-YEAR . . .	361	203	158
UNIVERSITY. . .	111	68	43

Control and observation variables can be nested or concatenated with TOTAL to obtain various levels of totals for wafers, stubs, and headings. For more examples, refer to pages 20-21 of the TPL User's Guide.

Other Statements in TPL. To aid the user in selecting data, computing new variables, defining new control variables, and computing averages or ratios for table generation, TPL provides four other statements in addition to the TABLE statement. These statements are:

- SELECT statement (pages 22-24 of the TPL User's Guide)
- COMPUTE statement (pages 25-27)
- POST-COMPUTE statement (pages 28-30)
- DEFINE statement (pages 31-37)

Each statement is described below. For more detailed information and examples of the statements, refer to the appropriate pages in the TPL User's Guide.

The SELECT statement allows specification of conditions that must be met by each record of the data file to qualify for further processing by TPL. Only one SELECT statement is allowed per request and it must immediately follow the USE statement (a statement stating which code book to use in obtaining the variable characteristics). The SELECT statement applies to all tables within the request. The SELECT statement takes one of the following two forms:

```
SELECT IF   conditions;
or,
SELECT UNLESS   conditions;
```

When the IF option is used, all records meeting the conditions will be selected. When the UNLESS option is used, all records which do not satisfy the conditions will be selected. If no SELECT statement appears in the request, all records will be selected regardless of their characteristics.

The COMPUTE statement provides a way of creating a new observation variable which has not been defined in the code book. The new variable is created from algebraic combinations of other variables and constants. The new variable becomes part of the record containing the variables used in the computation. The computed variable will be aggregated over the entire file when used in a TABLE statement. Any computation which uses the arithmetic operators, add (+), subtract (-), multiply (*), and divide (/), is allowed.

Computed variables are always considered to be observation variables and can be used in following TABLE statements in any place that code book defined observation variables can be used.

Only previously defined observation variables defined in either the code book or a previous COMPUTE statement can be used in the computation together with constants. The constants must be integer values. Parentheses may be used to any level. All computations are performed before tabulation.

The purpose of the POST COMPUTE statement is to produce generated cell values which are the result of arithmetic cell values of the tables produced from a TABLE statement. Each variable used in the computation must be an observation variable, and will be aggregated as a final total before the computation takes place.

The observation variables used in the POST COMPUTE may or may not be displayed within the table. All terms valid in the COMPUTE statement are valid in the POST COMPUTE statement except that a numeric literal may not appear alone on the right side of a POST COMPUTE, and a post computed variable may not appear within another POST COMPUTE statement.

The DEFINE statement allows a new variable to be defined which groups, deletes, and/or reorders values of an old variable. The resulting new variable will be a control variable. The new variable is always a control variable, while the old variable may be either control or observation. The old variable may either be defined in the code book or be a computed variable. It may not be a variable created by another DEFINE or POST COMPUTE statement.

The TPL Code Book. The TPL code book (file definition) describes a data file to be used in the production of tables. Information provided in a code book includes names of data items, where they are located within a record, how many character positions each occupies within a record, and valid entries for those variables containing classifying values (i.e., the code values for control variables).

A TPL code book must be prepared before a user can make a table run. This makes the description of data independent of the procedure which produces tables.

The first entry within a code book names the code book, followed by entries defining all data items within the file. The code book is checked for format errors, converted to machine-readable form, and stored all in one processing step. The code book name may then be referenced by anyone wishing to produce tables. By specifying "USE code book name" as the first statement in subsequent TPL requests, all data items within the code book become available for use in following TPL statements.

A user need not know all the details of a code book to produce tables except for the names and characteristics of those data items required for a table. For the user's convenience, each data item is listed in alphabetical order, along with its characteristics, in the abstract portion of the code book listing.

The code book is usually prepared by someone who is familiar with the file content and has file maintenance responsibilities. Names chosen for data items should be descriptive so that they can easily be recognized by other users. Please refer to pages 38-49 of the TPL User's Guide for more information concerning the TPL code book.

Table Formatting Procedures. The user of TPL has optional control over the appearance of the table. If he does not execute this option, the system will automatically format table features such as stubs, columns, and headings using names of variables shown in the code book. These may not be acceptable as published titles. If the user chooses to control the appearance of the table, then the column and stubs widths may be set as desired, and one's own choice of alphabetical labels for each variable table title is permitted. Special features allow hyphenation and centering of table titles and column headings. Taken together, these features can create tables that are acceptable for direct photo-offset printing of many tables.

Table formatting occurs at three distinct levels and execution times:

- At TPL code book creation time when variable labels and value labels are specified for future table generation
- During TPL processing of a request when print parameters called toggle switches are set by the user
- During the Print Control Language (PCL) processing step when previously generated tables may be altered to fit special needs.

When a code book is created, the user can specify both labels for the variables and for the values of a variable. These labels will be printed as headings when a table is created in a TPL table generation request. Special features of TPL allow for explicit control of how a label will be segmented (i.e., how the words in a label will be spaced) if there is not room for the label in the allocated space. This involves both placement of words on different lines and hypenation of words between lines. For a discussion of print labels and label segmentation, refer to pages 60-70 of the TPL User's Guide.

Special parameters called toggles permit the user to influence the print format of output tables. Options include space allocation for stub and column widths, scaling of cell data, and page size specification. Percent distribution of final cell data can also be requested. Toggles are considered on either a "global" or a "local" basis; i.e., toggles can be set for the entire request or they can be set for specific TABLE statements. Please refer to pages 71-78 for a further discussion of these options.

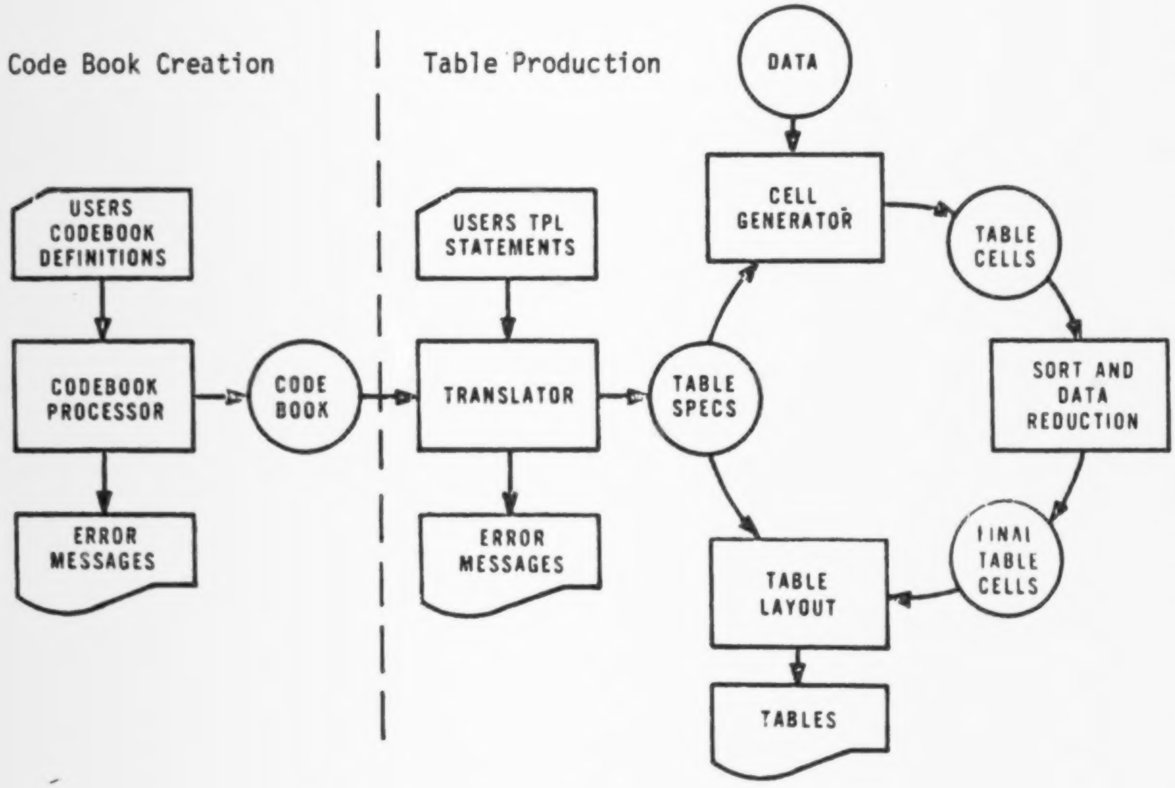
Print Control Language. Usually the table layout formatting options discussed above are acceptable for analysis and some types of publications. However, for publications that require tables to display additional items such as dollar signs, decimal points, percent signs, or even footnotes, TPL provides an additional formatting option called the Print Control Language processor.

To improve table layout capabilities without making TPL more complex, a separate processing module exists for altering the format of TPL produced tables. This separate module is called Print Control Language (PCL), and may be optionally invoked as a separate job step following a TPL run. In addition, PCL can be used to alter the appearance of a table after the cell data have been aggregated and saved, without repeating the TPL run.

PCL allows the user, by means of descriptive key words, to reference and alter any number of tables. Within a table, the wafer, stub, and heading titles may be relabeled; empty rows may be deleted; column widths of varying sizes may be specified; and footnotes may be added. Individual cell data can be displayed with dollar signs, decimal points, cents or percent symbols. Cell data may be displayed together with text and/or a footnote number. For a further discussion of PCL features, refer to pages 84-107 of the TPL User's Guide.

USING TPL AT NCHEMS

Introduction. Before discussing the actual details of accessing the TPL system and producing reports, it might be useful to briefly describe how the overall system works. Essentially, there are two distinct processing steps. The first step is to create a code book which will later be used by the table generation step to produce tables. Once the code book is created, the user can submit TPL statements, which define the table(s) to be produced, and the data file to be accessed. This process is shown in the figure below.


Code Book Creation
Table Production
USERS CODEBOOK DEFINITIONS
CODEBOOK PROCESSOR
ERROR MESSAGES
CODE BOOK
USERS TPL STATEMENTS
TRANSLATOR
ERROR MESSAGES
TABLE SPECS
DATA
CELL GENERATOR
TABLE CELLS
SORT AND DATA REDUCTION
FINAL TABLE CELLS
TABLE LAYOUT
TABLES

Code book creation is a completely independent step that must always be completed first before tables can be produced. As is shown in the figure, input to the code book processor consists of user's source statements (usually on cards) defining the data file, and output consists of a data set called the object code book which is usually located on a disk.

To produce tables, the user submits TPL statements (usually on cards consisting of combinations of TABLE, COMPUTE, DEFINE, SELECT, AND POST-COMPUTE statements) to the translator along with information from the object code book. These statements are then compiled into table specifications. TPL then reads in data from the data file to generate tables which are eventually printed out and/or saved for later format modifications by the PCL system.

Accessing the System. The TPL system is available at United Airlines where the load library is located on the Information and Analytic Resource disk pack. There are several IBM/OS procedures available for different processing steps in TPL. Currently, all but two of the procedures are available only on cards while the other two procedures are located on the user's proc lib. These two procedures, TPLDEF and TPLGEN, are the procedures for creating a code book and for producing tables. These two procedures are adequate for processing most TPL requests and for this reason were placed on the user's proc library. If there is sufficient use of the other procedures, then these procedures also will be put on the proc library. On the following pages are detailed descriptions of the procedures for creating a code book and for producing tables along with short descriptions of the other procedures that are available.

TPL Procedures

TPLDEF

Function - This procedures creates an object code book for later use by the table producing procedures.

Input - Input consists of TPL code book statements, usually read from cards.

Output - An object code book is created if the statements are translated satisfactorily. Additionally, the source statements are also saved. The proc is set up so that the data sets have a data set name of the form:

@ 1044. & cbn. CBSOURCE.V35
@ 1044. & cbn. CBOBJ.V35

where "& cbn" is the value the user has chosen for the symbolic parameter "CBN" on the EXEC card (see example below).

Required Parameters

CBN = name of the code book

Optional Parameters of Special Note

CBVOL = File pack (vol ser) of the code book
(Default = D00809)

CBUNIT = Device type of the code book
(Default = 3330)

CBPREFX = UAL account prefix for permanent data sets
(Default = @ 1044)

CBSPACE = Number of primary tracks allocated for object code book
(Default = 7)

CBINR = Number of secondary tracks allocated for object code book
(Default = 2)

ERRORS = Condition code for saving the object code book
(Default = 4 - "mild" errors, i.e., the code book is saved if only mild errors occurred in the translation.)

Usage

```
// stepname EXEC TPLDEF, CBN = code book name

//CB.CODEBOOK DD *

       code book source statements
```

Example

```
//STEP1 EXEC TPLDEF,CBN=OFECB

//CB.CODEBOOK DD *

    OFE CODE BOOK RECFM = FB LRECL = 80 BLKSIZE = 3200

        01 INSTS RECORD LEVEL 0

             •

             •

             •

        END OFE CODE BOOK
```

In this example, the procedure will create two data sets with the name:

@1044.OFECB.CBSOURCE.V35 and

@1044.OFECB.CBOBJ.V35

TPLGEN

Function - This procedure is used to produce tables from a defined code book, user's source statements, and a data file.

Input - Input to this procedure consists of three separate data sets:

- TPL source statements to produce tables (usually on cards)
- A previously defined object code book
- A data file

Output - This procedure outputs the generated tables to the printer.

Required Parameters

CBN = name of a previously created object code book defining with the data file

DATA = full name of the data set containing the raw data

Other Parameters of Special Note

CBVOL = File pack (VOL SER NO.) of object code book (Default = D00809)

CBUNIT = Device type of object code book (Default = 3330)

DATAVOL = File pack (VOL SER NO.) of data file (Default = D00809)

DATADEV = Device type of data file (Default = 3330)

SEQ = File sequence number of data files on its volume (Default = 1, this procedure is particularly for data coming from tape)

LAB = Type of label for data file (Default = SL)

Usage

```
//stepname EXEC  TPLGEN,CBN=code book name, DATA=full name
//TPL.REQUEST    DD   *

  TPL Source Statements
```

Example

```
//STEP3 EXEC   TPLGEN,CBN=OFECB,DATA=@1044.EDSTAT.OFE74,
        DATADEV=2314,DATAVOL=D00031
//TPL.REQUEST   DD   *
      USE    OFE:
      TABLE A:  STATE,CONTROL BY TYPE:
           •
           •
           •
```

In this example, the procedure will produce tables using data from the data set @ 1044.EDSTAT.OFE74 which is located on a 2314 unit, volume serial number D00031. An object code book that defines the data file was previously created and stored with the name OFECB (full data set name would be @ 1044.OFECB.CBOBJ.V35 - see TPLDEF proc).

Other Procedures Available.

TPLCBABS. This procedure generates and prints an abstract of an existing code book. The procedure is useful if more than one copy of a code book information is necessary.

TPLCBOLD. This procedure updates a TPL code book previously created. The entire code book source deck with modifications must be resubmitted.

TPLERCHK.	This procedure checks TPL table generating request for errors and then displays table structures. By using this procedure before the TPLGEN procedure, the user can save some processing time, particularly if the user is uncertain of the table structure desired.
TPLSAVE.	If the tables produced by TPLGEN are to be reformatted by the PCL (Print Control Language) module at a later date, then this procedure should be invoked in the same job as the TPLGEN procedure. The procedure essentially saves the internal descriptions of the tables produced by TPLGEN.
TPLMOVE.	If the data sets saved in the TPLSAVE procedure are to be moved to another device (e.g., tape backup), then this procedure can be used to move and save the data sets.
PCLERCHK.	This procedure is similar to the procedure TPLERCHK. The procedure checks TPL statements and associated PCL statements for errors, and also displays the resultant table structures.
PCLRERUN.	This procedure retrieves stored tables which were saved by the procedure TPLSAVE, and reruns the tables through the PCL system to reformat the tables.
PCLGENTB.	This procedure is imilar to TPLGEN but combines both the TPL processing with PCL processing in one procedure. The procedure produces printed tables.

Contact. If any questions arise concerning the use of TPL, please contact David Makowski. Copies of the other TPL and PCL procedures can be obtained from David Makowski.

SPECIAL CONSIDERATIONS AND COMMENTS

Codebook Creation. From our experience in using TPL, the most difficult step is creating a code book. A major difficulty arises from the TPL code book translator not recovering when an error is found in a statement. When an error is encountered, the translator continues reading statements trying to recognize a point at which it can begin processing again. In this process, errors are accumulated and the translator gives up after 50 errors, resulting in only a partial compilation. At this point, the error is fixed by the user, and the code book is resubmitted. Our experience has shown that a code book with 30 to 40 variables usually requires eight to ten tries to achieve a successful compilation. To compound this difficulty, if all the possible control values are not defined in the code book, TPL will reject records with undefined data values when attempting to generate tables. The undefined values occur either from an oversight in defining all possible values in the code book, or from bad values on the records in the file. To rectify this situation, either the code book can be recompiled with new values or the bad values on the record can be corrected.

Table Generation. Producing tables in TPL is a very easy, straight-forward process. However, there are some limitations and special considerations a user should be aware of.

- Only one SELECT statement is allowed per TPL request. This causes some difficulty when a series of tables are to be produced where the tables have a different selection criteria. To circumvent this limitation, it is necessary to process separate TPL requests for each selection.

- There is no explicit option for treating missing data in TPL as there is in some statistical packages (e.g., SPSS). Normally, by using the SELECT statement or by redefining a control variables, missing data can be successfully rejected from the tables.

- Sometimes more complex statistical analysis is required on the data produced in the tables. TPL provides a subfiling feature, but the data is subfiled in a special format suitable for the statistical system SOUPAC. This package is not available at NCHEMS, and is unlikely to be made available. The possibility of generating a subfile that an available statistical system (such as OSIRIS) can access is currently being investigated.

- One fairly serious limitation in TPL is its inability to handle variables with decimal points (e.g., unit costs or FTE faculty). All observation variables, as defined in a code book, must be an integer format although an implied decimal point can be assumed. With some extra processing involving a COMPUTE statement, tables can be produced with data values containing decimal points. Suppose a table is to be produced where a variable in one of the expressions is to be shown with a decimal point. This can be done by using the COMPUTE statement to create a new variable from the old, integer defined variable with an implied decimal point, as follows:

```
COMPUTE   NEWDUC:  DUC/100   USING 9999.99;
```

Here DUC is the variable "direct unit cost" defined with an implied decimal point, and NEWDUC is the new computed variable which will print with a decimal point in the correct place when producing a table. The term 9999.99 specifies the format to be in printing a value: four digits followed by a decimal point followed by two places after the decimal point.

- Although TPL has no explicit file coordination feature, for some applications similar files can be concatenated together (through JCL), and processing performed across all the concatenated data files. This type of processing occurred as part of some studies concerning IEP institutions. There were fifteen files where each file contained an institution's cost data organized by FICE code and PCS code. All files had a similar format and one TPL code book was sufficient to define the files. These fifteen files were concatenated together, and reports were produced that showed various costing measures by institution. The concatenation is accomplished by over-riding a DD statement in the procedure TPLGEN as follows:

```
//CELLGENR.INPUT2 DD   DSN = data set 1, UNIT = . . .
//                DD   DSN = data set 2, UNIT = . . .

//                DD   DSN = data set n, UNIT = . . .
```

This set of statements follows the TPL source statements.

NCHEMS COMPUTER SERVICE VENDORS

INFORMATION BRIEF F1 MAY, 1976

ABSTRACT

NCHEMS has historically used a wide variety of computer services in the course of product development and data analysis activities. Since November, 1975, many of these activities have been converted for use at NCHEMS Remote Job Entry Facility interfacing with United Airlines. However, a significant number of projects utilize other computer services, and thus there is a need to, at least briefly, document the array of resources and capabilities currently available to NCHEMS staff.

UNITED AIRLINES

This center provides standard IBM OS services to a number of remote users. This is due to the fact that United has an extra computer always available as a backup to its reservations system computer. It is the extra computer that NCHEMS uses for its processing.

- Current NCHEMS Usage: most projects, including:
  - State-Level Information Base
  - Statewide Analysis

- Institutional Data Uses
- Information and Analytic Resources
- Various WICHE projects, including Analysis and Planning for Improved Distribution of Nursing Personnel and Services

- Location: W. A. Patterson Computing Center, Denver Technological Center, Englewood, Colorado 80110
- Hardware: Two IBM 360/195's, one IBM 360/65
- Operating System: OS/MVT 21.6 with HASP
- Pricing Structure:
  - $ .50 per CPU second
  - $ .50 per 1,000 EXCP's
  - $15.00 per hour disk usage (3330 disks)
  - $ 7.50 per hour disk usage (3314 disks)
  - $ 8.00 per hour tape usage

  (Note: A 69% surcharge is currently appended to total job cost for RJE expenses.)

  - $12.50 per hour connect charge and no long distance charges when accessed from anywhere else in the United States
- Advantages:
  - Low processing costs compared with speed
  - Copious mountable disk space available
  - Low RJE rates
  - MARK IV available
  - Service available outside normal business hours

- Disadvantages:
  - No special purpose hardware such as microfilm or plotter
  - No time-sharing (currently)
  - Central site moderately inaccessible (one hour travel each way)
- Customer Contacts: Jon Burley (303-779-2000)
- Relevant Publications:
  - _Procedures Manual and Programming Guide_, United Computer Service, W. A. Patterson Computer Center; Denver, Colorado
  - _OS/VS JCL Services_, IBM GC 28-0617-2
  - _OS/VS JCL Reference_, IBM GC 28-0618-2
  - _OS Utilities_, IBM GC 28-6586-15
  - _OS SORT/MERGE Program_, IBM GC 28-6538-9
  - _OS Tape Labels_, IBM GC 28-6680-5
  - _OS/VS Message Library: Utilities Message_, IBM GC 38-1005-3
  - _OS/VS Message Library: VS1 System Messages_, IBM GC 38-1001-2
  - _OS/VS Message Library: VS1 System Codes_, IBM GC 38-1003-3
  - _OS SORT/MERGE Program_, IBM GC 28-6543-7
  - _IBM OS Linkage Edition and Loader_, IBM GC 28-6538-9
  - _IBM System 360 and System 370 FORTRAN IV Language_, IBM GC 28-6515-10
  - _FORTRAN IV (G and H) Programmer's Guides_, IBM GC 28-6817-4
  - _IBM OS Full American National Standard COBOL_, IBM GC 28-6396-4

COLORADO UNIVERSITY COMPUTER CENTER

The Colorado University center is the most accessible to NCHEMS offices and has historically provided most analysis-based services for staff.

- Current NCHEMS Usage:
  - Western States Budgeting
  - Information About Students
  - State Postsecondary Education Planning Model
- Location: University of Colorado East Campus (33rd and Marine Street)
- Hardware: Two CDC 6400's
- Operating System: KRONOS 2.1
- Pricing Structure:
  - Approximately $ .20 per CPU second
  - Approximately $ 5.00 per 1000 EXCP's
  - $8.00 per hour 300 baud connect time
  - $ .25 per month per 1000 characters for permanent file storage
- Advantages:
  - Good accessibility from NCHEMS office
  - Supports time-sharing
  - Many special peripheral devices available (micro-film, CALCOMP plotters, TEKTRONICS CRT's)
  - SPSS available
- Disadvantages:
  - Permanent mass-storage and mass-storage access are expensive
  - Lacks a good data management system
  - Does not support mountable mass-storage
  - Does not support nine-track tape drives
- Customers Contact: Herb Smith (303-492-8137)

- Relevant Documentation:
  - University of Colorado Computing Center User's Manual
  - KRONOS 2.1 Reference Manual. Publication 60407000 (Rev. C)
  - KRONOS 2.1 Time-Sharing User's Reference Manual. Publication 60407600 (Rev. B)
  - KRONOS 2.1 Text Edition Reference Manual. Publication 60408200 (Rev. B)
  - SORT/MERGE Version 4 Reference Manual. Publication 60343900 (Rev. G)
  - MODIFY Reference Manual. Publication 60281700 (Rev. C)
  - CYBER Record Manager Version 1 Reference Manual. Publication 60307300 (Rev. F)
  - FORTRAN Reference Manual - 6000 Version 2.3. Publication 60174900 (Rev. F)
  - FORTRAN Extended Version 4 Reference Manual. Publication 60305600 (Rev. D)
  - FORTRAN at the University of Colorado. Report No. 74-8
  - 6000 COMPASS Version Reference Manual. Publication 60360900 (Rev. C)
  - COBOL Reference Manual - 6000 Version 4. Publication 60384100 (Rev. C)
  - Multi-Access Retrieval System (MARS) for Full Inversion Reference Manual (Version 2.1). Publication 17313000 (Rev. A)

SERVICE BUREAU CORPORATION

SBC has been considered several times for possible national access to NCHEMS computer products. SBC maintains an elaborate network of multiplexor sites for its operations.

- Current NCHEMS Usage: Inactive
- Location: Cleveland, Ohio

- Hardware: 7 IBM 370/158's
- Operating System: OS/VSI
- Pricing Structure:
  - $0.30 per CPU second (1 hour turnaround)
  - $5.00 per 1000 disk EXCP's
  - $10.00 per hour 300 baud connect time
  - $48,00 per hour 4800 baud connect time
  - $2.10 per month per 13K bytes (1 track) for permanent storage
- Advantages:
  - Large, nationally available OS system
  - Large library of application programs
- Disadvantages:
  - Extremely expensive
  - Remote accessibility
- Customer Contact: Jim Vitkus (303-771-5510)
- Relevant Publications:
  - Command Language Reference Manual. Publication 65-2403-6
  - Data Analysis (**DATAPACK Documentation). Publication 65-2491-2
  - TIMEPACK II Reference Manual. Publication 65-2700
  - CALL/370: 6FORTRAN Reference Manual. Publication Form No. SJ126-1
  - HASP/RJE System Reference Manual. Publication Form No. CS-324A
  - CALL/370 Program Library Index. Publication 65-2310-13
  - Center Services Reference Manual. Publication 65-2435-2
  - CALL-LINK User's Manual. Publication 65-2717-1
  - Utility Programs. Publication 65-2628
  - Statistical Package. Publication 65-2208-2
  - CALL/370: PROPHLT II Reference Manual. Publication Form No. 65-2640

INFONET/COMPUTER SCIENCE CORPORATION

INFONET has been used by NCHEMS primarily with EDSTAT II. INFONET's network is extremely elaborate, and accesses computer centers in California, Illinois, and Virginia.

- Current NCHEMS Usage: Access to EDSTAT
- Location: EDSTAT uses Chicago Hardware
- Hardware: A Distributed Network of Univac
- Operating System: CSTS
- Pricing Structure:
  - $ .25 per SRU (SRU is contractually underfined)
  - $8.00 per hour 300 baud connect time
  - Approximately $.75 per kilobyte per month permanent file storage
- Advantages:
  - Large computer network
  - Large library of applications packages
- Disadvantages:
  - Relatively expensive
  - No mountable disk packs
  - Remote central site accessibility
- Customer Contact: Curt Fowler (303/893-5020)

- Relevant Documentation:
  - Guide to General Programming Subsystem (GPS). Publication EE0138-01
  - SYSTEM 2000 Reference Manual. Publication E00209-01
  - CSTS System Message Manual. Publication E00159-01
  - CSTS FORTRAN IV Language Reference. Publication E00043-01
  - CSTS GPS Reference, Volume 1: General. Publication E00157-01
  - FORTRAN Programmers Guide. Publication E00178-01
  - CSTS SORT/MERGE. Publication E00154-01 (Rev 2)
  - CSTS STAT-PACK Program Abstracts. Publication E00163-01
  - SPSSTS. Publication E00204-02
  - CSTS Concepts and Capabilities. Publication E00175-01
  - INFONET Catalog of Documents. Publication E00212-01
  - SYSTEM 2000 General Information Manual. Publication MP012-BRO-001
  - DML General Information Manual. Publication E00202-01

GENERAL ELECTRIC TIMESHARING

GE timesharing service has been used in the past primarily for short statistical applications.

- Current NCHEMS Usage: Implementation and Documentation of SPEPM
- Location: Rockville, Maryland
- Hardware: Honeywell 6000 Equipment
- Operating System: MARK III/GECOS
- Pricing Structure:
  - $7.00 per terminal connect hour plus $.25 per 1000 I/O characters

  - $16.00 per hour for 4800 baud dial-up RJE services
  - $.10 per computer resource unit (undefined)
  - $.75 per kilobyte per month permanent file storage

- Advantages:
  - World-wide network
  - Elaborate customer applications libraries
  - In-house access via the RJE

- Disadvantages:
  - Relatively expensive
  - Remote central cite accessibility

- Customer Contact: Jack Cuney (303/320-3177)

- Relevant Publications:
  - HSS -- High-speed Service. Publication 3910.01B (Rev B)
  - Command System. Publication 3501.01I (Rev I)
  - Editing Comments. Publication 3400.01F (Rev F)
  - DMS and HISAM. Publication 5610.01A-3, 5605-02A-2
  - FORTRAN IV. Publication 3102A (Rev A)
  - RMS-Remote Media Services. Publication 3710.04B
  - DMS -- Data Management System. Publication 5610.01A
  - Background User's Guide. Publication 2000.26
  - FBI -- Foreground-Background Interface. Publication 2000.01B (Rev B)
  - Control Cards. Publication 2000.03A (Rev A)
  - $FORTY Series 6000 FORTRAN Compiler. Publication 2200.01

OTHER VENDORS

NCHEMS also has open accounts with the following unused vendors:

- Boeing Computer Services (IBM 370)
- Boulder Valley Schools (IBM 370 VM)
- Colorado School of Mines (PDP 10)
- Administrative Computing Center, University of Colorado (IBM 370/145 VS)

NATIONAL CENTER FOR HIGHER EDUCATION MANAGEMENT SYSTEMS AT WICHE

INFORMATION AND ANALYTIC
RESOURCE GUIDE

*REMOTE JOB ENTRY
FACILITY*

INFORMATION BRIEF F2 JULY, 1976

ABSTRACT

NCHEMS conducts a substantial portion of its data processing operations through a REMOTE JOB ENTRY (RJE) facility located in Room 169 of PSRB No. 2. This facility provides a mechanism for reading card decks into a computer, inquiring on the status of executing jobs, and receiving printer output. While this facility is operated and maintained by NCHEMS, it is available for use by all other WICHE staff and other nonprofit organizations on a special arrangement basis.

GENERAL

The RJE Concept. A RJE is basically a card reader and line printer linked through regular telephone lines to a computer center (see Figure 1). This set-up allows sending decks of cards through the card reader and receiving output on the printer. A RJE allows no direct interaction between the job and the user as in timesharing computing. Once a job initiates execution, the user has little control over the job until it reaches the end of execution. The RJE additionally provides the user with the off-line capability to print program or data decks on the printer for editing purposes.

DOCUMENTATION AND PUBLICATIONS

- Data 100 Terminal Systems: Line Printer User's Manual; Publication No. 21511056, Data 100 Corporation, 1973.
- Data 100 Terminal Systems: Card Reader User's Manual; Publication No. 21511057, Data 100 Corporation, 1973.
- Data 100 Terminal Systems: Model 76-3 Batch Terminal (RMT 360 M/L Mode) User's Manual; Publication No. 21515319, Data 100 Corporation, 1975.
- Procedures Manual and Programming Guide: United Computer Service, W. A. Patterson Computer Center, Denver.
- United Airlines Computer Service: Information Brief F3, Information and Analytic Resource Guide, NCHEMS at WICHE; Boulder, Colorado; April, 1976.

Because of low-operation speed, the RJE is not entirely suitable for jobs with large source decks or lengthy output. For example, it can take up to 15 minutes to read a box of cards (2,000 cards) and 20 minutes to print 5,000 lines of output. Although the RJE can handle such volume it is suggested that such requests be submitted via RJE when it is not in regular use.

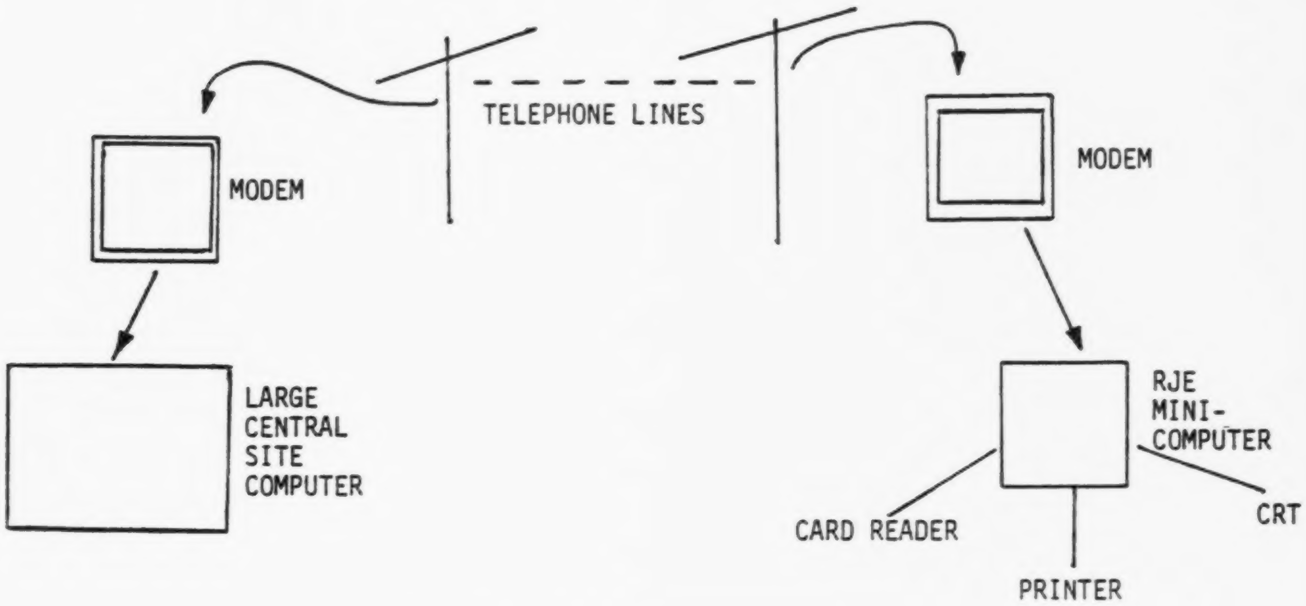

TELEPHONE LINES
MODEM
MODEM
LARGE CENTRAL SITE COMPUTER
RJE MINI-COMPUTER
CARD READER
CRT
PRINTER

FIGURE 1: RJE COMMUNICATIONS

RJE Equipment. Currently the following equipment (hardware) is housed at NCHEMS facility:

- One Model 76 Data 100 mainframe. This is essentially a small mini-computer with 8,000 bytes (characters) or memory to which the card reader, printer, and CRT (and potentially other devices) are attached.

- One Data 100 Seventy-Series 150 card/minute card reader.

- One Data 100 Seventy-Series 300 line/minute line printer.

- One Data 100 Seventy-Series Cathode Ray Tube (CRT Display Console). This device -- appearing as a small television set with a keyboard -- is permanently connected to the other RJE hardware and cannot be used for other timesharing applications.

All of the above equipment is leased directly through the Data 100 Corporation field office in Denver.

In addition, NCHEMS rents telephone lines and a special piece of circuiting called a 208B modem from Mountain Bell. This modem has a transmission rate of 4,800 baud (approximately 500 characters per second) and is the interface between the RJE and the telephone lines.

Communications. Because the RJE hardware includes a small mini-computer, it can communicate with many types of large central computers merely by loading different programs into the mini-computer memory during logging-on procedures. This process is termed "emulation" which refers to the RJE hardware's ability to "appear" to the central computer like a special piece of equipment designed especially for it. Note that the RJE can be connected to only one central site computer at a time.

Currently, NCHEMS has emulators for the following kinds of equipment:

- IBM 2780

- IBM 360/20 (For communicating with HASP)

Other emulators may be purchased in the future.

Facility Maintenance, Security, and Scheduling. The RJE is currently installed in Room 260 of PSRB No. 2, however, the RJE will be located in Room 169 as of August, 1976. The RJE room provides space for the basic RJE hardware, several teletype terminals, one IBM 209 keypunch, and a small supply of card and paper stock. The tables and shelves in the RJE room are for user convenience. However, staff cooperation is requested in keeping materials left in the room to a minimum.

While the noise level associated with the RJE and keypunch are minimal, areas surrounding the RJE room are potentially affected. For this reason, please keep the door to the room closed (and locked after normal working hours).

Generally, the facility will be operational during the normal work day (8:00 a.m. to 5:00 p.m.). During these hours the first person requiring the RJE should log-on and leave the system logged-on. At approximately 5:00 p.m. the RJE will be logged-off by a specified staff member if there is no current activity. The RJE will be available beyond the normal work day (hours 8:00 a.m. to 5:00 p.m.), but will require the personal supervision of the interested party.

Thus staff who use the RJE beyond normal working hours will have full responsibility for log-on and log-off, powering the hardware up and down, and maintaining room security.

Once a month (at a time to be specified) the RJE will be unavailable for use because of preventive maintenance (PM) by Data 100 personnel. Check the bulletin board in the RJE room for a PM schedule.

Accessing Various Computer Centers. Use of the RJE hardware will tend to vary depending on which computer center is being accessed. Thus, more detailed information can be obtained from reading documentation of high-speed processing distributed through the appropriate center.

It is anticipated that a substantial portion of NCHEMS data processing will be done at United Airlines Center (see information Brief F3).. The RJE hardware and software is currently geared for use with this computer center, and this center will be logged-on most of the time.

The RJE, however, can be used with other computer systems with varying degrees of difficulty. Other IBM OS/HASP installations similar to United Airlines can be accessed with little difficulty. Emulators for other hardware can be leased for $22/month, and additional modems can be leased for $130/month. Access to the GE system (see Information Brief F1) is possible using the IBM 2780 emulator.

Users requiring access to a system other than UAL are urged to contact Kent Weldon to arrange an appropriate schedule.

Recovering RJE Expenses. To recover the costs of the RJE, each project using the facility will be assessed a surcharge based on usage. An estimated surcharge rate will be computed several times a year based on the anticipated usage of the RJE and the anticipated expenses of the RJE. Project accounts will be charged monthly using this provisional rate. Periodically, the actual surcharge rate will be computed from known past usage and the past RJE expenses. If necessary, the project accounts will be modified to reflect actual usage and expenses. Project managers are provided a memorandum on a monthly basis listing all computer charges including the RJE surcharge. This billing memorandum is distributed by Kay Vaughan.

To illustrate this procedure, assume there are three projects using the RJE with the following projected data processing expenditures for a one-month period, and also assume RJE expenses are estimated at $2,000 per month.

Project	Anticipated Data Processing Expenditures (1 month)	Anticipated Surcharge (1 month)
A	$ 3,000	$ 600
B	2,000	400
C	5,000	1,000
Total	$ 10,000	$ 2,000

If anticipated RJE expenditures are $2,000 per month, then the estimated surcharge for each project is approximately 20% ($2,000/$10,000). This surcharge for use of the RJE equipment and supplies will be levied monthly through the purchasing office.

Because the surcharge is forecasted on the basis of anticipated usage and expenses, disparities with actual usage and expenses may arise. Thus, approximately every three months an after-the-fact accounting of actual usage and expenses will be made and account balances modified. The following example demonstrates this.

Project	Actual Data Processing Usage (3-Months, Exclusing RJE Costs)		Actual RJE Costs Apportioned By Usage	RJE Surcharge Previously Levied	Due To (From)
A	$ 12,000	(33.3%)	$ 1,667	$ 2,400	$ 733
B	6,000	(16.7%)	833	1,200	367
C	18,000	(50.0%)	2,500	3,600	1,100
Total	$ 36,000		$ 5,000	$ 7,200	$ 2,200

Obtaining Additional Help. The Data 100 User's Manuals (catalog racks in the RJE Room can answer most questions related to normal operation of the system.

HELPFUL DATA 100 OPERATING PROCEDURES

	Page
Printer (See Line Printer Operation Manual)	
General Use	3-1
Forms Loading and Positioning	3-3
Ribbon Replacement	3-7
Abnormal Conditions	3-12
Card Reader (See Card Reader Operation Manual)	
General Use	3-1
Abnormal Conditions	3-3
Batch Terminal (See Model 76-3 Batch Terminal Operation Manual)	
Emulator Loading	2-1
Log-on	2-2
CRT Use	2-3
Reading Cards	2-4
Printing Output	2-5
Error Conditions	3-1

FIGURE 2

For any situation which seems to be a major (or unresolvable) system error, either hardware or software, the following procedure should be used.

1. Call Kent Weldon and Anahid Katchian
2. If one of these people is not available, call the service number on the hood of the line printer and explain the problem. Calls to the service engineer should be avoided until it is determined that a system failure has actually occurred.
3. Power down the equipment if assistance will take a lengthy time.

Operating the RJE. If the RJE has been previously logged-on properly, the process of reading jobs into the card reader and obtaining printer output is quite simple. The reader is directed to the step-by-step instructions in Figure 3.

If the RJE is logged-off and powered down, a somewhat more lengthy process must be followed to make it operational. (See the step-by-step instructions in Figure 4 labeled Starting from Power-Off Condition.) Once the RJE is logged-on, jobs can be read in and printed as stated above. Logging-off the RJE is simply a matter of reading in the special log-off card and waiting approximately 30 seconds. (See Powering Down the RJE.)

NORMAL CARD DECK READING AND PRINTING OPERATIONS

- Reading Jobs Into the RJE

  1. Place the card deck onto the Card Reader, face down, column 1 to the left.
  2. Press the END OF FILE switch if the entire job can be read in one group of cards.
  3. Press the START switch. Cards should begin feeding through the Card Reader. If the reader stops, resettle the card deck and press the START button again. If a card has actually jammed in the reader, do not attempt to pull it out, but rather call for assistance.
  4. When the STOP indicator lights, more cards can be loaded into the reader, and the process beginning at Step 2 can be recycled.

- Printing Output on the RJE

  1. The printer is ready whenever the START indicator is lit.
  2. If the Printer must be stopped, the STOP button will suspend printing. The START button must be pressed before the Printer will continue. No output from the computer will be lost.
  3. When the supply of paper is exhausted, the procedure outlined on Page 3-3 of the Line Printer Operation Manual should be followed.

FIGURE 3

INITIALIZING AND TERMINATING RJE OPERATIONS

- Starting From Power-Off Condition

  1. Press the CLEAR/Power-on Switch on the Card Reader, the Printer, and the CRT.
  2. Locate a deck of cards labeled "HASP/20" and place these in the Card Reader face down, column 1 to the left.
  3. Press the LOAD switch. The Card Reader should read all but the last card without stopping. If the Reader stops, reassemble the deck and begin this step again.
  4. The Card Reader will pause at the last card. Press the RUN switch and the remaining card should go through the Card Reader.
  5. Push the telephone LINE button, dial 773-6870, and wait for a high-pitched sound. Then, press the telephone's RED button and hang up.
  6. The CRT screen should read "COMMUNICATIONS ESTABLISHED." If not, the log-on has failed and should be repeated from Step 2.
  7. Enter the log-on information on the log-on sheet provided next to the Card Reader.

- Powering Down the RJE

  1. Locate a single card marked SIGN OFF and read through the Card Reader by pressing the START switch.
  2. Power off the Card Reader, Printer, and CRT.
  3. Make the appropriate entry on the log-on sheet.

FIGURE 4

UNITED AIRLINES COMPUTER SERVICES

INFORMATION BRIEF F3 MAY, 1976

ABSTRACT

United Airlines is NCHEMS' primary computer services vendor. Access to the UAL computer center is accomplished through a Remote Job Entry facility at NCHEMS, which is limited to UAL's central site in Denver via telephone line. This information brief documents a number of procedural matters involved in using UAL services for which additional literature is either insufficient or voluminous.

INTRODUCTION

The United Airlines Computer Center (W. A. Patterson Computer Center) is located approximately ten miles south of downtown Denver in the Denver Technological Center. The center is primarily intended to support UAL's on-line flight reservation and travel arrangements system (PARS) which occupies much of the computer resources and support personnel. Because of this fact, building and staff security are extremely tight, and all vital system functions (including hardware and power generation) are provided with second and third-level back-up systems.

DOCUMENTATION AND PUBLICATIONS

- Procedures Manual and Programming Guide, United Computer Service, W. A. Patterson Computer Center; Denver, Colorado.
- OS/VS JCL Services, IBM GC 28-0617-2.
- OS/VS JCL Reference, IBM GC 28-0618-2.
- OS SORT/MERGE Program, IBM GC 28-6543-7.
- OS Tape Labels, IBM GC 28-6680-5.
- OS Utilities, IBM GC 28-6586-15.
- OS/VS Message Library: Utilities Messages, IBM GC 38-1005-3.
- OS/VS Message Library: VS1 System Messages, IBM GC 38-1001-2.
- OS/VS Message Library: VS1 System Codes, IBM GC 38-1003-3.
- IBM OS Linkage Editor and Loader, IBM GC 28-6538-9.
- IBM System 360 and System 370 FORTRAN IV Language, IBM GC 28-6515-10.
- FORTRAN IV (G and H) Programmer's Guides, IBM GC 28-6817-4.
- IBM OS Full American National Standard COBOL, IBM GC 28-6396-4.

Because of excess computer resource capacity, UAL provides computer services to clientele on one of its back-up computer systems. This system also provides basic administrative data processing services to UAL's staff.

Hardware Configuration. The Computer Center system consists of twin IBM System 360 Model 195's with a large assortment of associated hardware devices. The "primary" system (PARS), provides on-line support for the reservations and travel arrangements facility, while the "secondary" 195 system serves as the PARS back-up device as well as providing administrative and vendor services.

Each central processor unit is a 3195 Model I with 2048K bytes of core storage. It has storage protection features and supports both decimal and extended precision floating point arithmetic. The CPU interval timer has a 104 microsecond interval. Each CPU has three 2860/3 Selector Channels, one 2970/1 MPX Channel, and three 2880/2 block MPX channels. The following peripherals are used by both systems.

4	2540/1	Card Readers
4	2540/1	Card Punches
4	1403/N1	Printers
12	2420/7 and 3420/7	1600 BPI Tape Drives
1	3420/7 800/1600 BPI	Dual Density Tape Drives
22	3330	Disk Spindles
48	2314	Disk Spindles

Software at UAL. The following IBM standard OS software and program products are maintained by UAL:

• Control Programs	OS/MVT, Release 21.6
	HASP II, Version 3 Level 1
	SMF
• Access Methods	QSAM, BPAM, BDAM, ISAM, BSAM
• Assemblers	Assembler F, H (4.0)
• Compilers	FORTRAN G, H, G1
	PL/I F, X (2.0)
	RPG E
	ANS COBOL - IV (4.1)
	GPSS (2.0)
	SSP (3.1)
	PMS (4.1)
	MPSX (1.3)
	CSMP (1.3)
	SORT/MERGE 1 (1.3)

Additional applications software includes:

• MARK IV	Data base management system
• OSIRIS	Statistical analysis system
• DOTS	Multi-purpose data set coping printing system

All tapes which become part of the UAL tape library must have a 900000 series volume serial assigned by the UAL tape librarian. The practice of leaving unidentified tapes at UAL without entering them into the tape library is strongly discouraged.

Any RJE job which accesses tapes or disks must contain a SETUP card for HASP staging purposes. The setup card *usually* contains an estimate of the *CPU* time and core required to execute the job, and *must* contain the volume serial of any tape or disk which the job may require. For example:

```
/*SETUP        TM=(,10),CR=150K,D00809,900123
```

specifies that one disk (D00809) and one tape (900123) will be required. In the event that a 900000 series tape volume serial is not the actual serial contained on a standard tape label, an alternate format should be used: for example,

```
/*SETUP        TM=(,20),CR=200K,900826(123456)
```

indicates that 123456 is the volume serial which will actually be needed when OS verifies the tape label but that on the external label the number 900826 appears. This alternate format should always be used to avoid unnecessarily confusing the OS operators. All tapes which have not been created at UAL will require this alternative format.

Disk Processing. Nearly all user-oriented direct access storage at UAL exists in the form of 2314 and 3330 mountable disk packs. Currently, the only data sets which NCHEMS keeps on public, permanently mounted disk space relate to the MARK IV Data Management System. All other datasets reside on one of the volumes cited below. NCHEMS users who require direct access storage should consult one of the indicated persons.

NCHEMS Mass Storage at UAL

Pack	Unit Tape	Use	Person Responsible
D00809	3330	Information and Analytic Resources Data bases and data base directories. Public use by permission.	Kent Weldon
D00246	2314	Exchange, Documentation, and Software Maintenance. Space for use of institutional computer products such as RRPM, SFM, CEDMS.	Ron Martin
D00031	2314	Institutional Data Uses. General institutional data use projects. Public use by permission.	Anahid Katchian
D00866 D00691	3330 3330	Analysis and Planning for Improved Distribution of Nursing Personnel and Services. Project data base and state model.	Mark Smith

Common Error Messages. OS system messages are issued in the form of program condition codes, utility and monitor messages, and system/user completion codes. While IBM system documentation (see Documentation and Publications) should be referenced for detailed information, a number of system completion codes occur frequently enough to be summarized here.

Common System ABEND Codes

002 - A data block being written is too long, vis-a-vis stated file characteristics or actual device characteristics

013 - A specified file could not be opened

    10 - Block size was undetermined

    18 - A PDS member could not be located

    20 - Block size not a multiple of record size

NCHEMS Access to MARK IV. By virtue of a special agreement with NCHEMS, United Airlines has secured Informatics' MARK IV data management system. Basically, NCHEMS pays a contract royalty to UAL for use of this product, and UAL interfaces directly with Informatics. Under this agreement, only NCHEMS staff can access the MARK IV package, although there are plans to convert the current arrangement for use by other UAL customers with a corresponding decrease in cost to NCHEMS.

MARK IV and its corresponding dictionary files are currently maintained on permanently-mounted disk space such that no special accessing procedures or devices are required for use. Staff are referred to Information Brief S3 for a more lengthy description of MARK IV usage.

Tape Processing. Because of UAL's elaborate customer security procedures, access to the tape library is restricted and carefully monitored. Thus, tape creation and deletion, as well as submittal or withdrawal of tapes must follow standard procedures.

There are two primary aspects of UAL's tape library:

- Primary access. These tapes are assigned by the tape librarian 900000 series volume serials (which may or may not correspond to actual volume serials) and are kept in UAL's tape vaults at a rate of $1.55 per month.

- Secondary access. These tapes also have 900000 series volume serials assigned, but are kept in less secure, less accessible storage. Access to these volumes requires 24-hour turnaround and a $1.00 accessing charge.

213 - A specified file could not be opened
    04 - file could not be found on indicated volume
222 - Operator cancelled job
322 - Job (or jobstep) exhausted time limit
606 - Insufficient core allocated for program
706 - A load module has been previously marked nonexecutable by the linkage editor.
813 - The DSNAME on a standard tape label does not match the name appearing in JCL

Imprecise Interrupts. These types of hardware error messages are unique to the 360/195 (i.e., these errors do not occur on other IBM 360 or 370 hardware). Essentially, the high processing speed of the central processing unit (CPU) makes it unable to indicate exactly at what point a hardware error occurred in a user program. Thus, all such errors are reported to the user as a system ABEND completion code of 0C0 with a user completion code as indicated in the following table.

Imprecise Interrupts

(0C0 System ABEND)

User ABEND Code	Program Check Type
0001	Decimal Divide
0002	Decimal Overflow
0004	Floating Point Divide
0008	Significance
0010	Exponent Underflow
0020	Exponent Overflow
0040	Fixed Point Divide
0080	Fixed Point Overflow
0100	Data Exception
0400	Addressing Exception
0800	Protection Exception

RJE Processing. Nearly all usage of UAL facilities occurs via NCHEMS Remote Job Entry Facility (RJE). Users are directed to Information Brief F2 for procedures regarding the use of RJE equipment and loading of the 360/20 HASP emulator.

HASP is the CPU control program on the 360/195's which monitor and interface with all RJE terminals. The user can formulate commands to HASP regarding the disposition of a job or the display of operating system information. A summary of HASP commands appears in Figure 1. All of these commands are entered on the CRT keyboard by simultaneously depressing the CNTL and the A keys, typing one blank character, the appropriate HASP command, terminated by simultaneously depressing the CNTL key and the D key. Typing the CNTL and X keys simultaneously will cause any characters previously entered to be ignored.

System Schedule. The normal system up-time schedule provides for RJE operation between the following hours:

0600 - 2400 Monday - Saturday
0800 - 2000 Sunday

However, this schedule is seldom observed rigorously, and RJE operations may occasionally be accepted beyond the hours noted, or alternatively, system downtime within the indicated hours may be scheduled with minimum notice. The most effective method of determining late-night schedules is to issue a message to the operator (use a DM00 command) inquiring about estimated down-time.

It should be noted that while the hours of 0800 - 1700 is the heaviest production period, it is also the period of longest wait for a disk volume to be mounted.

FIGURE 1

HASP Commands Available from RJE

GENERAL SYSTEM COMMANDS:

Format	Description	Example
CJn	Cancel job number n immediately from further HASP processing	CJ106
DA	Display job information for all active jobs in the HASP system	DA
DD	Display the unit address and volume serial of all on-line direct access devices	DD
DI_n	Display status for the indicated initiator	
DN ,XEQc ,q	Display job in information for jobs on HASP queues where: c = job class q = type of HASP queue	DN,XEQD or DN, HOLD
DQ ,XEQc ,q	Display the number of jobs on various HASP queues where: c = job class q = type of queue	DQ or DQ, XEQA or DQ, PRT
DJn - nn	Display job information for the indicated job number	DJ80-85
DF	Display the number of jobs queued for special forms output	DF
DU	Display the current status of all HASP controlled nondirect access devices	DU

REMOTE COMMANDS:

BRM72, PR1 ,p ,D	Cause a remote printer to skip backwards and reprint all or part of the current data set where "D" indicates entire data set and "p" indicates the number of pages.	BRM72.PR1,5 BRM72.PR1,D
CRM72.d1	Cancel immediately the current activity on one or more remote devices	CRM72.RD1
DF,72	Display the number of jobs distinct for remote output which are queued for special forms	DF, 72
DM00, 'message'	**Display a message to the operator**	DM00,'HI'

Hasp Commands Available From RJE (Cont'd)

REMOTE COMMANDS:	Description	Example
DN,72 ,XEQc ,q	Display job information for remote 72 jobs on HASP queues	DN72,XEQ DN,72,PRT
DQ,72 ,XEQc ,q	Display the number of remote 72 jobs queued which have output	DQ,72,
DRM 72	Display the address and status of devices associated with remote work stations	DRM
FRM 72.PR1 P ,D	Forward skip the printer the specified number of pages "p" or forward skip entire data set (D).	FRM72.PR1,D
ZRM 72.d1	Halt (suspent) the activity on the indicated remote device	ZRM72.PR1
IRM72.d1	Interrupt and terminate the activity on the indicated remote device	IRM72.PR1
NRM72.d1	Make a copy of the current activity on a remote device	NRM72.PR1
ERM72.d1	Terminate the current activity on a remote device and restart from the beginning	ERM72.PR1
Rq, job number Local RM 72 , RM72	Reroute the output for a specified job or remote to an alternate destination	RPRT,6,LOCAL RPRT,RM72,LOCAL
SRM72.d1	Start a previously drained remote device	SRM72.RD1
PRM72.d1	Stop one or more remote devices from performing any new activities	PRM72.PU1

LEGEND TO SYMBOLS USED ABOVE:

d = RD, PR, or PU
n = Three-digit job number
c = job class (e.g.,A,B,M)
q = PRT, PUN, HOLD

Job Costing. All United Airlines computer service billing information is taken directly from the monthly listings which are provided by United and printed on the first working day of each month for the preceding month's activity. These listings are subsequently summarized and distributed to staff by Kay Vaughan after appending an estimated RJE Service Surcharge amount to each project's actual data processing expenditures.

Although the actual job cost is not printed on each computer run. the following price schedule allows users to approximate the cost of a particular run.

Pricing Schedule

(For use of UAL S/360 195)

All Jobs:

CPU Charge	$ .50 per second
EXCP	.50 per 1000
Disk usage	15.00 per hour
Tape usage	8.00 per hour

RJE Jobs:

Surcharge on total job cost	69%

Jobs Submitted at Central Site (Additional Charges):

Printing	$ .06 per page
Reading cards	1.00 per 1000 cards
Punching cards	4.00 per 1000 cards

Note: The price schedule listed above is approximate only and assumes modest limitations on CPU, core, and other device requirements.

Users desiring a complete listing of job-by-job expenditures can either view the listings in Kay Vaughan's office or can request that a xerox copy be made.

UAL Contacts. Although NCHEMS users of UAL computer resources are strongly encouraged to resolve their programming difficulties with other NCHEMS staff, the following UAL personnel may be of assistance for special types of problems.

UAL Contacts

• Customer Service Representatives	
Jon Burley	779-2000
Jerry Spetosky	
Bill Mozealous	
• Computer Operator Hotline	779-2222
• Data Control Clerk	779-2255
• Tape Librarian	779-2257

NATIONAL CENTER FOR HIGHER EDUCATION MANAGEMENT SYSTEMS AT WICHE

INFORMATION AND ANALYTIC
RESOURCE GUIDE

State Postsecondary Education
Planning Model (SPEPM)

INFORMATION BRIEF P1 MAY, 1976

ABSTRACT

The State Postsecondary Education Planning Model (SPEPM) includes a system of general, flexible software for performing dynamic optimization and simulation on a set of equations and data supplied by the user. SPEPM was primarily eveloped to aid state-level educational agencies in the formulation of state-level policy decisions. But because of the flexibility in the design of SPEPM, it could be used as an analytic tool in a variety of situations, to solve a number of different problems including student demand studies, faculty distribution and tenure analysis, facilities replacement and renewal schedule, enrollment forecasting, and financing studies.

GENERAL DESCRIPTION

The SPEPM system consists of two FORTRAN computer programs and a set of design files and data files. The two programs are:

- SPEPM - the main computational module, and
- DREAMS - the report writer module

DOCUMENTATION AND PUBLICATIONS

- An Introduction to the State Postsecondary Education Planning Model by Vaughn Huckfeldt. Technical Report No. 77, NCHEMS at WICHE, Boulder, Colorado, April, 1976.

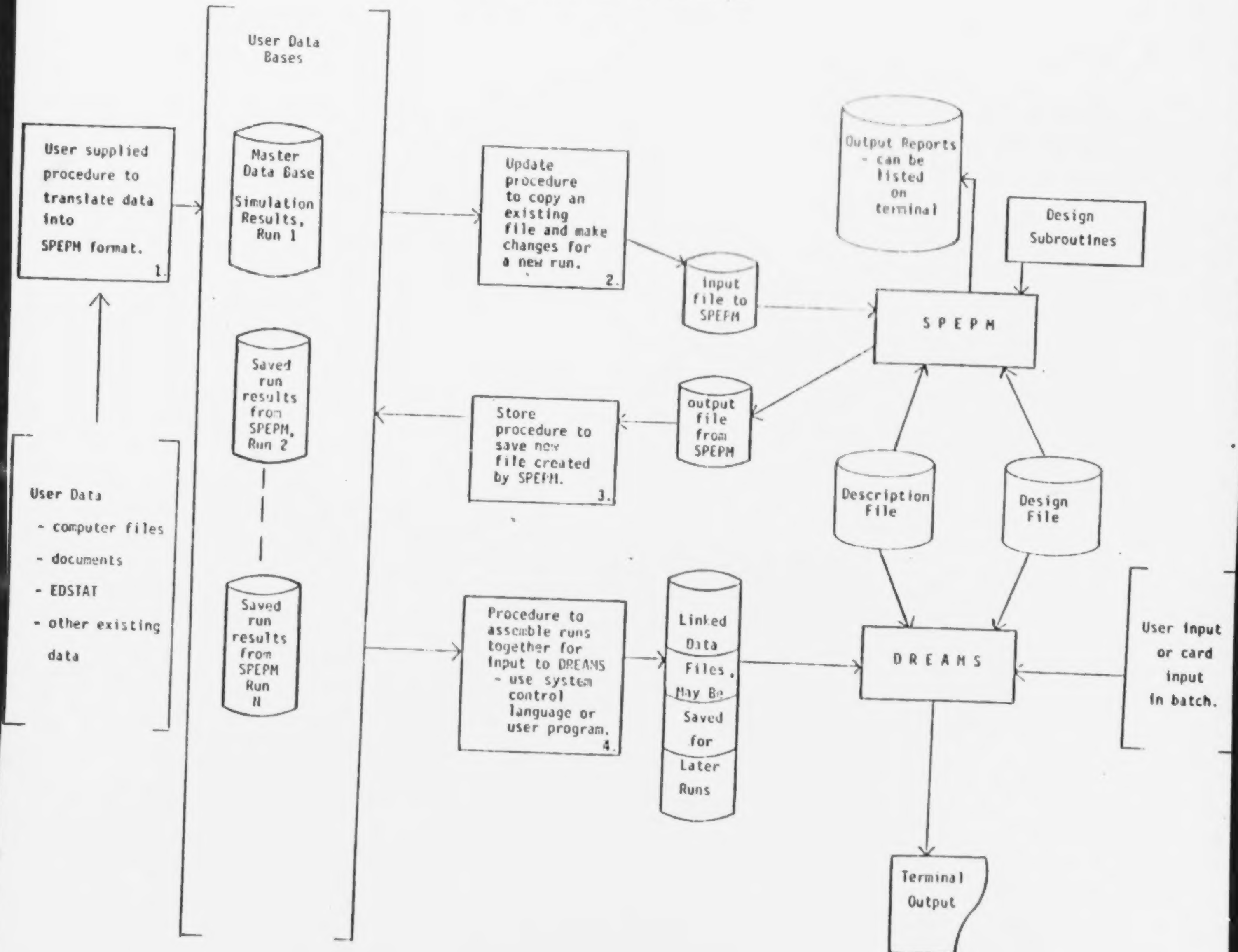
- A Design Guide for the State Postsecondary Education Planning Model by Vaughn Huckfeldt. Technical Report No. 78, NCHEMS at WICHE, Boulder, Colorado, April, 1976.

- State Postsecondary Education Planning Model Software Documentation by Mark Chisholm. Technical Report No. 80, NCHEMS at WICHE, Boulder, Colorado, April, 1976.

- State Postsecondary Education Planning Model Training Manual by Vaughn Huckfeldt and Ellen Cherin. Technical Report No. 79, NCHEMS at WICHE, Boulder, Colorado, April, 1976.

Figure 1

SPEPM File Relationships


User Data Bases
User supplied procedure to translate data into SPEPM format. 1.
User Data
- computer files
- documents
- EDSTAT
- other existing data
Master Data Base
Simulation Results, Run 1
Saved run results from SPEPM, Run 2
Saved run results from SPEPM Run N
Update procedure to copy an existing file and make changes for a new run. 2.
Input file to SPEPM
Store procedure to save new file created by SPEPM. 3.
output file from SPEPM
Procedure to assemble runs together for input to DREAMS - use system control language or user program. 4.
Linked Data Files, May Be Saved for Later Runs
Output Reports - can be listed on terminal
Design Subroutines
S P E P M
Description File
Design File
D R E A M S
User input or card input in batch.
Terminal Output

The relationships that define a model or design to be run on the system are built into the design subroutine, the design file, and the description file. The data to be used in a particular run are contained in the data base file. The relationships between the programs and the files are illustrated in Figure 1.

To provide the flexibility desired in SPEPM, it was necessary to separate the relationships that define a model from the rest of the SPEPM system. These relationships, termed design equations, are specified in FORTRAN subroutines called the design subroutines. It is useful, then, to view SPEPM as a shell or framework that links the design from one file, takes in data from another file, and proceeds to process the data through the equations. Since the design is not locked into the software, modifications to the design are easily made. There is a tradeoff between additional effort by the user in creating the design equations for a particular problem and providing flexibility within the systems.

The design file and the description file are related to the design subroutines by providing additional information to SPEPM about the design equations. For the description file, this information is a label for each variable in the design equations. The label allows for a more readable report. The design file provides the following information about the design equations:

1. The number of sectors in the model, the design to be used with each sector, the run number of the data base to read, and the run number on the data base being written.

2. A description of each design that specifies:
    a. the number of each kind of variable
    b. the number of planning periods
    c. control information to SPEPM, and
    d. some text identification for that design
3. Label information that is used to identify output produced by both SPEPM and DREAMS.

The data base file contains the actual values necessary to run the design. The file is sequential with fixed length records where each record consists of five key fields and one value field. Each record is uniquely identified by the value of the five key fields.

Refer to pages 5-31 in SPEPM Software Documentation for more details concerning the design files and the data base file.

USAGE INFORMATION

This section provides the basic details necessary to run the SPEPM system. Much of the discussion involving technical details is deferred until the next section. It should be realized that certain steps in the operation of SPEPM require a technical, computer background. Although once initial steps are completed, the general user can produce a rich, complex, detailed set of reports with minimal difficulty and technical background. A staff member with a computer background, such as Mark Chisholm or David Makowski, should be contacted to provide assistance in creating the design subroutines and the procedures for formatting the data base. After completing the design subroutines and translating the data base into the correct format, the user is then ready to run the SPEPM system. For NCHEMS staff the SPEPM system along with user procedures are available on three systems:

- IBM/OS 360/195 at UAL
- CDC-6400 at the University of Colorado
- GE Timesharing

(See Information Brief F1 for further information on these systems.)

Because of the higher cost of running SPEPM on the GE system and because the GE system provides no additional enhancements to running SPEPM, the discussion in this brief will consider running SPEPM only on the IBM and CDC systems.

Although the SPEPM computational module operates equally well in either a batch or interactive mode, the report writer, DREAMS, was designed to be primarily run in an interactive mode. For this reason and because UAL does not provide interactive operations, operating the SPEPM system at CDC interactively is advantageous in terms of both usage and interaction with the system. The primary disadvantage of the CDC system is cost, particularly if working with a large data base. With these considerations in mind, the user can decide upon which system to use, but for the general user, it is recommended that the CDC system be used. It is this system which will be presented in this section.

The SPEPM Computational Module. Before the report writer module, DREAMS, can be run, the SPEPM computational module must be executed to generate data for the DREAMS module. This is an easy process once the initial steps have been completed. An example of running the computational model is shown below.

User input is in small case letters.

```
76/05/17.  18.03.43.    CU16    USER NUMBER:    z4xx     Account Number
PASSWORD                                                 Password
TERMINAL:      35,TTY
RECOVER/SYSTEM:BATCH                                     System
RFL,20000.
/NEW,SUB                      Information for submitting a job
/AUTO
00100  /JOB
00110  NDJM,T40,CM50000.      Job Card                   Statement to Execute
00120 ACCOUNT,z4xx,yyy.                ↖Design File              SPEPM
00130 CALL,SPEPM(DB=WRKDB,DC=WRKDC,DF=WRKDF,DS=WRKDS,NDB=WRKNDB)
00140 /EOF            ↑           ↑               ↑          ↖
00150             Data Base  Description      Design       New data base file
/SUBMIT,,B           File        File      Subroutines
08.51.01.NDJMA6Z  Printed output will be found under this job banner at the
 5 SUBMIT (S) LEFT.          Computer Center.

/BYE
```

In this example, the desired files are specified to the SPEPM program in line 00130. After submitting the job, the system returns a job name or job banner, in this case NDJMA6Z. The output report generated by this run will be printed at the C. U. Computer Center and can be located with the banner NDJMA6Z.

Any output produced by the SPEPM program is controlled by the print switch values set in the design file. Many of the possible print options are intended for debug checks on the software. The print options most often used are switches three through ten, providing a printout of the sector conditions following both the simulation of the model and the execution of the optimization algorithm in the SPEPM program. Figure 2 lists the functions of these eight switches and a complete listing of all the switches available is found on page 34 of the SPEPM Software Documentation.

Print Switch	Function
3	Prints Dynamic State Variables
4	Prints Control Variables
5	Prints Exogeneous - Simulation Only
6	Prints Constants - Simulation Only
7	Prints Term and Target Values
8	Prints Measures
9	Prints Exogeneous - Before and After Optimization
10	Prints Constants - Before and After Optimization

Figure 2

Operation of Dreams. DREAMS (Data Report, Examination, Analysis, and Management Systems) is the report writer module for the SPEPM system. It is designed to run primarily in an interactive mode. It can be run as a batch job, however, by submitting a card deck with the desired commands to be executed as input to the program.

All commands to DREAMS entered by the user are entered in a free-field format. For all commands the user needs to enter only as many characters of the command as needed to uniquely identify that ccmmand. For example, there is only one command starting with the letter 'V'-VERIFY. If the user wished to enter the command VERIFY, the following would all be equivalent.

V

VE

VER

VERI

VERIF

VERIFY

As another example, there are three commands starting with a 'T': TABLE, TYPE, and TIME. Therefore, the user would need to enter at least the first two characters of each of those commands to uniquely specify it.

Blanks and/or a comma are used to separate a series of several commands or numbers of a line. In some commands, the symbols '(','_', '/', and '*' can also serve as delimiters as well as having meaning within the command.

If it is necessary to continue a command over the next line, a '$' can be entered. The rest of a line following a $ will be ignored and the next line will be treated as a continuation of the preceding line (the dollar sign also serves as a delimiter). Column 72 is the last column of information read on each line. There are three subsystems within DREAMS, and a number of control commands are effective when the user is outside the subsystems.

The 'DESIGN' subsystem allows the user to list parts of the design file. DREAMS will not modify the design file but it is often useful to list out a summary of the file after modifications have been made with a text editor or other update mechanism. The 'SUMMARY' subsystem will print out a summary of the entire data base supplied by the user to DREAMS. The results from more than one run may have been appended together and each run may have several sectors of data--with each sector associated with a different design. Since the user must specify the reports to be produced by using the run, sector, type, index, and time value of each data value, the summary is invaluable as a glossary of the user supplied names and the key codes on the data base. The summary also provides a check of the structure of a file.

The 'TABLE' subsystem provides the main service of DREAMS and serves as the report writer. The report writing procedure proceeds as follows:

1. The user specifies a subset of data to be read off the data base file into core (the SPECS command).

2. The user then tells DREAMS how that subset should be arranged when printed out in a table (the SORT command).

3. The user can check the specifications and display order (VERIFY or CHECK commands), and then produce the table if everything looks right (the PRINT or XEQ commands).

4. The user can then re-enter another specification to produce another subset (after the RESTART or ABORT commands), specify another display order on the same subset of data, or leave the TABLE subsystem (with END command).

Refer to pages 44 through 47 of the SPEPM Software Documentation for more details concerning commands within the TABLE subsystem. An example of a run in DREAMS is shown below. A more detailed example can be found on pages 48 through 60 of the SPEPM Software Documentation.

```
                           User input is in small case letters

76/05/17.  18.03.43 CU16    USER NUMBER:   z4xx     Account number
PASSWORD
████████                                            Password
TERMINAL:    35,TTY
RECOVER /SYSTEM: batch                              System
$RFL,20000.           description file name
/CALL,ADREAMS(DB=WRKDB,DC=WRKDC,DF=WRKDF)           To call program DREAMS
1              data base          design file
               file name              name

        DATA REPORT, EXAMINATION, ANALYSIS, AND MANAGEMENT SYSTEM

                  DREAMS -- VERSION 1.0 -- MARCH 1976


 --- DREAMS ---
 COMMANDS ARE SUMMARY, TABLE, DESIGN, OR CONTROL COMMAND
 ENTER COMMAND
? control                         To obtain complete listing of control commands

 CONTROL COMMANDS

   FULL        -- PRINT FULL QUESTION DETAIL
   SHORT       -- ONLY PRINT ONE LINE QUESTIONS
   BATCH       -- DO NOT PRINT OUT QUESTIONS
                  (A CARRIAGE RETURN WILL FORCE
                   PRINTING OF FULL QUESTION)

   FINISH      -- WILL END PROGRAM AND CAUSE SUMMARY
                  OF CALLS AND TIME TO BE PRINTED
   END         -- WILL END PROGRAM WITH NO SUMMARY

 --- DREAMS ---
 COMMANDS ARE SUMMARY, TABLE, DESIGN, OR CONTROL COMMAND
 ENTER COMMAND
? short
 ENTER COMMAND
? table                  To enter report writing mode of DREAMS
  ENTER TABLE COMMAND
?                        Carriage return forces listing of table commands available
 FOR TABLE, COMMANDS ARE
 SPECS, VERIFY, SORT, PRINT, RESTART, END
  ENTER TABLE COMMAND
? specs (*/1/e/4/1,2)    Specification of table to be printed (page 44 of Software
  ENTER TABLE COMMAND                                document)
? specs (*/1/c,a,t/*/1*2)
  ENTER TABLE COMMAND
? sort name run          Sort order for table specified (page 45 of Software document)
  ENTER TABLE COMMAND
? verify                 Request for verification of specifications and sort order
```

```
 SUMMARY OF SPECIFICATIONS

 RUN                    ALL
     SECT               VALUE      1
          TYPE          VALUE      E
               INDX     VALUE      4
                    TIME STRINGS   1     2
          TYPE          STRINGS    C     R     T
               INDX     ALL
                    TIME RANGE     1 THRU    2

 SUMMARY OF SORT ORDER

    COLUMN HEADING IS RUN
       ROW HEADING IS NAME
 PARAGRAPH HEADING IS TIME
      PAGE HEADING IS SECT

  ENTER TABLE COMMAND
? PRINT                         Command to print table requested


    WORKSHEET EXAMPLE RUN

            1975
                                 SIMULATION       OPT RUN  SIMULATION      OPT RUN
                                OF ORIGINAL OF ORIGINAL OF MODIFIED OF MODIFIED
                                DATA VALUES DATA VALUES DATA VALUES DATA VALUES
                                 RUN NO.  1  RUN NO.  2  RUN NO.  3  RUN NO.  4
 TUITION PER STUDENT                1000.00     1000.00     1000.00     1000.00
 STATE DOLLARS                  13000000.00 13000000.00 13000000.00 13000000.00
 NCB GOAL                         200000.00   200000.00   200000.00   200000.00
 END OF YEAR NCB                 2000000.00  2000000.00  2000000.00  2000000.00

            1976
                                 SIMULATION       OPT RUN  SIMULATION      OPT RUN
                                OF ORIGINAL OF ORIGINAL OF MODIFIED OF MODIFIED
                                DATA VALUES DATA VALUES DATA VALUES DATA VALUES
                                 RUN NO.  1  RUN NO.  2  RUN NO.  3  RUN NO.  4
 TUITION PER STUDENT                1000.00     1400.00     1000.00     1200.00
 STATE DOLLARS                  13000000.00 13000000.00 14200000.00 14200000.00
 NCB GOAL                         200000.00   200000.00   200000.00   200000.00
 END OF YEAR NCB                -2200000.00   200000.00 -1000000.00   200000.00


  ENTER TABLE COMMAND
? END                       To leave report writer mode


 LEAVING TABLE
 ENTER COMMAND
? END                       To leave DREAMS
* NORMAL TERMINATION OF DREAMS *
/BYE                        To leave the system
```

TECHNICAL INFORMATION

This section discusses some of the more technical aspects necessary to run the SPEPM system. It is intended that the information presented here will be of assistance to those staff with the responsibility of providing assistance to other staff members and of maintaining the SPEPM system.

Before the actual computational module, SPEPM, can be run by a user, a series of procedures for file manipulation and updating must be provided. These procedures are boxes one through four in Figure 1.

- Box 1 - The data needed for a particular design should be assembled into the format required by the SPEPM data base file and description file (see Chapter IV of SPEPM Software Documentation). This initial file should be run through SPEPM in a simulation mode, and the resulting output should then be saved as the Master Data File with run number 1.
- Box 2 - To make a particular policy run, a copy should be made of an existing data base file and the desired data value changes should be made. The design file may also need to be modified to set the number of iterations, print switch values, and the run number and run label of the new run.
- Box 3 - If a new data base file is produced by a SPEPM run, it may be saved permanently. The user must keep track of the different runs and which data base

files to maintain. The input file to SPEPM may be either saved at this time or destroyed.

- Box 4 - DREAMS allows the user to produce reports that compare the results from several runs. The user must append together (or concatenate with job control language) the data base files that are to be compared. Each data base file must be identified with a unique run number. This appended file may be saved for later runs of DREAMS or recreated each time.

For running SPEPM at NCHEMS, boxes 3 and 4 have been incorporated as part of the procedures for accessing SPEPM. For performing the updating procedure in box 2, the KRONOS Text Editor may be used when running the system at the University of Colorado Computer Center. A program to translate data into SPEPM format must be provided for or by the user. Software for performing this operation is currently being developed by staff on the SPEPM project.

The user, with the assistance of a staff member with a computer background, must also provide design equations (a model) in the form of FORTRAN design subroutines. A set of procedures to develop a design is discussed in A Design Guide for the State Postsecondary Education Planning Model, pages 4-11. An example of how to develop a design showing the identification of relevant variables and the development of the relationships is given in the same document on pages 19-53. Additionally, examples of actual designs, including FORTRAN code, are provided on pages 54-80 of that same document.

Running SPEPM on the CDC-6400. Copies of user's procedures for running SPEPM can be obtained by contacting Mark Chisholm. The procedures should be saved as a permanent file under the user's account. To run the SPEPM system, the procedures are invoked by a CALL statement with the appropriate parameters specified in the CALL statement. A listing of the procedures along with comments on critical parameters follows.

Figure 3 shows an example of a procedure for executing the SPEPM computational module.

```
00100          GET,DS.
00110          RFL,65000.
00120          SETTL,1000.
00130          RETURN,BIN,LBIN,SPMRUN.
00140          RUN,I=DS,L=0,B=BIN,LN.
00150          GET,BSPM34/UN=2415.
00160          LIBGEN(F=BIN,P=LBIN)
00170          LINK(F=BSPM34,P=LBIN,B=SPMRUN)
00180          GET,TAPE11=DF.
00190          GET,TAPE12=DC.
00192          GET,TAPE13=DB.
00194          GET,TAPE17=INTABL/UN=Z415,PW=NODUMP.
00200          SPMRUN,LC=77777,,OUTPUT.
00210          IF(.NOT.FILE(OUTPUT,TT.OR.PR))REPLACE,OUTPUT.
00230          IF(FILE(TAPE15,LO))REPLACE,TAPE15=NDB.
00240          * NORMAL TERMINATION OF SPEPM 3.0 RUN *
```

Figure 3

In this procedure, the following parameters are of special interest:

- DS - the design subroutine stored as a FORTRAN source code on a permanent file
- DF - the design file
- DC - the description file

- DB - the data base file
- NDB - the new data base created from the SPEPM run

  (Note: The new data base is saved only if one was created.)
- OUTPUT - by setting this parameter, the print out may be saved as a permanent file. Otherwise, the procedure outputs the results on the printer.

An example of the CALL statement to invoke the SPEPM procedure is:

```
CALL,SPEPM (DS=SAMDS,DF=SAMDF,DC=SAMDC,DB=SAMDB,NDB=NSDB,
OUTPUT=RPSAM)
```

In the example, SAMDS, SAMDF, SAMDC, and SAMDB are all permanent files stored under the user's account number. NSDB and RPSAM are the names of the permanent files to be saved from the creation of the local files NDB and OUTPUT.

Note that the load module is saved as file BSPM34 under account Z415. The design subroutines are compiled each time they are used although the binary module for the design subroutines could be saved after each change to the subroutines.

Figure 4 shows an example of a procedure to execute DREAMS.

```
00070          RFL,61000.
00080          GET,TAPE11=DF.
00090          GET,TAPE12=DC.
00100          GET,TAPE13-DB.
00110          GET,TAPE17=INTABL/UN=Z415,PW=NODUMP.
00120          GET,BV1/UN=Z415.
00130          BV1,LO=7777.
00140          * NORMAL TERMINATION OF DREAMS *
```

Figure 4

Note, to run DREAMS requires input from either DREAMS' control cards if run from batch, or user commands if run interactively. BV1 is the name of the DREAMS binary module. The parameters DF, DC, and DB are the same as in the SPEPM procedure, and the procedure is invoked in a similar manner.

Running SPEPM at UAL

Only the three procedures that actually execute the SPEPM and DREAMS systems will be discussed in this section. Information concerning the other procedures which perform file maintenance functions can be obtained by contacting Mark Chisholm or David Makowski.

Procedure Name - COMPSRC

Function - This procedure will retrieve the indicated source deck (design subroutine) from the source library, compile it, link it, and replace the load module on the load module library.

If the linkage editor cannot place the new module on the load module library PDS, the procedure will compress the library and again attempt to link-edit.

Required Parameter - NAME = Deck name in source library of design subroutine

Optional Parameters -

SRCDSN = Source library data set name

SRCVOL = Volume serial number for source library

SRCUNIT = Device type for source library

LNKDSN = Load module library data set name

LNKVOL = Volume serial number for load module library

LNKUNIT = Device type for load module library

Usage -

```
//stepname  EXEC     COMPSRC,NAME=deckname',PARM.COMP'=
       'NOSOURCE','PARM.LKED'=NOMAP
 //COMP.SYSPRINT     DD*    DUMMY
 //LKED.SYSIN  D *
NAME     deckname  (R)
```

Note: Square brackets indicate optional parameters or statements.

Example -

```
 //STEP1   EXEC    COMPSCR,NAME=SUBR1,'PARM.LKED'=NOMAP
 //LKED.SYSIN  DD *
NAME    SUBR1 (R)
```

Special Notes - The parameter NAME is the member of the PDS load module. The parameters, PARM.COMP AND PARM.LKED, are parameters to turn off source and load map listings. The statement--//COMP.SYSPRINT--is included if the compiler listing is not wanted.

Procedure Name - SPEPM

Function - This procedure retrieves the SPEPM load module, a user selected design load module, links these modules and executes them. The final linked version is not kept permanently.

Required Parameter -
DF = Input definition file data set name
DC = Input description file data set name
DB = Input data base data set name

Note - If the user creates a new data base, this data base is temporary and must be saved by executing a procedure for saving the new data base.

SPEPM Control Cards -

```
//stepname EXEC   SPEPM DF=design file name,DC=description
file name, DB=data base name ,'PARM.LKED'=NOMAP
//LKED.SYSIN  D  *
   INCLUDE LIB1(SPEPM,load module name of design subroutine)
   ENTRY  MAIN
```

Example -

```
//STEP3  EXEC SPEPM,DF=@1044.SPEPMLDF1,
         DC=@1044.SPEPM.DC1,
         DB=@1044.SPEPM.DB1
//LKED.SYSIN DD *
   INCLUDE LIB1(SPEPM,SUBR1)
   ENTRY MAIN
```

Special Notes - The load module name of the design subroutine should be the same as the name used in the COMPSRC procedure. If no load map is desired, include the parameter "PARM.LKED=NOMAP."

Procedure Name - DREAMS

Function - This procedure executes the DREAMS program.

Required Parameters - DF = Definition file data set name

DC = Description file data set name

DB = Data base file data set name

Optional Parameters - LNKDSN = Load module library data set

LNKVOL = Volume serial number for the load module library

LINUNIT = Device type for the load module library

Usage -

```
//stepname  EXEC DREAMS,DF=definition file names,DC=description
file name,DB=data base name ,'PARM.DREAMS'=NOMAP
//DREAMS.SYSIN  DD *
   DREAMS control cards
```

Example -

```
//STEP2 EXEC DREAMS,DF=@1044.SPEPM.DF1,
                    DC=@1044.SPEPM.DC1,DB=@1044.SPEPM.DB4
//DREAMS.SYSIN DD *
         control cards
/*
```